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VIEWS, NEWS AND INTERVIEWS.

President Eckert has issued orders to all Western Union managers to send "Collect," without the guarantee formerly required, messages of traveling agents or representatives addressed to their home firms upon sufficient evidence of their connection with those firms.

Printers' Ink compares an advertisement to an electric current. The newspaper is the switchboard. The advertisement is the operator. When the advertiser would electrify the public he manipulates the switchboard, and the powerful current which he so thoroughly controls enlivens the community and often shocks or even kills a competitor.

Governor Flower, of New York, has vetoed the bill prohibiting the use of nickel-in-the-slot machines.

It costs one dollar to telegraph 10 words to San Francisco, which is about 3,000 miles from New York. It costs one dollar to send 10 words by wire to Budd's Lake, N. J., which is 75 miles from New York. While this seems unfair, yet it is quite equitable. It is true that Budd's Lake is only 75 miles from New York, but to get a message there the telegraph company is obliged to send it by messenger from Stanhope or Flanders, a distance of 12 miles. As a matter of fact, the rate is really cheaper than the rate to San Francisco.

Among the curious displays to which electricity has been made to lend itself in household decoration is a dish of illuminated jelly in which an incandescent lamp has been buried.

During five years, from 1883 to 1887, there was a yearly average of 206 deaths caused by lightning in the United States, and for four other years up to 1893 the yearly average was 196 deaths. In eight years ending with 1892, lightning caused 3,516 fires, with a loss of $12,663,835, in the United States, for the most part west of the Rocky Mountains. During nine years ending with 1892, 2,335 barns, 104 churches and 664 dwellings have been struck by lightning.

A bootmaker said that "nae doot it was a braw licht, but he got an awfu' shock twa or three weeks since." "Oh, and how did it happen? Tampering with the wires, eh?" "Naething o' the kind, ava. It was jist ae glance at the bill." After this who will dare to say that a Scotchman cannot make a joke.—*London Electricity.*

The Supreme Court has decided that the Western Union Telegraph Company is not liable for damages to the sender of a message in cipher for errors in transmission. The case came up from the Circuit Court for the Eastern District of Pennsylvania, where Frank J. Primrose sued the telegraph company for $100,000 damages for mistakes in sending a cipher telegram.

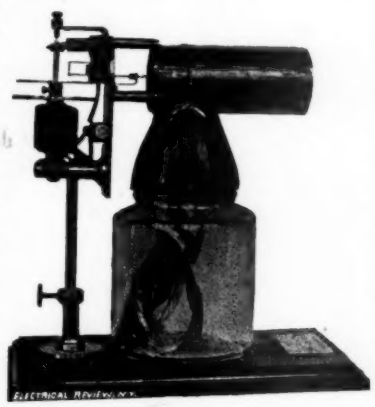
Thirteenth Annual Exposition of the American Street Railway Association.

The Executive Committee of the American Street Railway Association announces that Machinery Hall, of the Piedmont Exposition Company, of Atlanta, Ga., has been secured for the exhibition of street railway supplies and manufactures, in connection with the thirteenth annual meeting of the Association, to be held in the city of Atlanta, commencing the third Wednesday in October (the 17th), 1894, and lasting three days.

The building has been engaged for two full weeks, beginning October 10 and ending October 24, thereby giving ample time for the removal of the largest exhibits. Several intending exhibitors at Milwaukee were sadly disappointed by the non-arrival of their goods until after the meeting was over. This was in large part due to the congested condition of freight traffic on trunk lines, owing to the World's Fair and the nearness of Milwaukee to Chicago. It is advisable to secure a time limit delivery; better still, to ship in plenty of time.

The convention hall is in the same building, and on the ground floor. The railroad facilities for freight purposes cannot be surpassed, inasmuch as the tracks on one side run the entire length of the building.

It may be mentioned that some of those who exhibited at Milwaukee have already applied for space at Atlanta. This is, perhaps, the best evidence of the value of making exhibits at these annual meetings, where street railway men gather in large numbers from all over the United States and Canada.



PLUMB'S ELECTRIC ATOMIZER AND DISINFECTING APPARATUS.

The Association of Railway Telegraph Superintendents.

The thirteenth annual meeting of the Association of Railway Telegraph Superintendents will be held at the Hotel Cadillac, Detroit, Mich., June 13 and 14, 1894. Arrangements have been made for accommodations at the above named hotel.

Suitable rooms for exhibits have been provided. Sessions of the Association will probably be held in forenoons and evenings, leaving the afternoons for examination of exhibits and for recreation. Arrangements have been made for free transportation from depots or steamship landings to the hotel of all members showing proper credentials. The Committee on Topics have secured a very interesting list of papers to be read and discussed.

Plumb's Electric Atomizer and Disinfecting Apparatus.

A novel electrical device is illustrated on this page. It is an electric atomizer and disinfecting apparatus, the invention of Mr. Charles Plumb, a well-known electrical engineer of Buffalo, N. Y.

The apparatus consists of a glass vessel for containing the chlorides, permanganate of potassium, carbolic acid or other disinfectant. The mouth of the vessel is provided with a diaphragm of absorbent material stretched across it; to this is attached a number of strands of cotton wick which dip into the disinfecting fluid and raise it to the diaphragm by capillary attraction. Over the mouth of this jar is fitted a chamber connected with a horizontal tube opening into it, and into this tube is fitted a fan or exhaust wheel operated by an electric motor which draws in the surrounding air and at the same time creates a vacuum in the chamber over the diaphragm which draws up the disinfectant, mixes it with the air and forces it out through the horizontal tube. In this way it is thoroughly mixed with the air, atomized and circulated through the apartments in which the apparatus is located.

If chlorine is used an attachment is supplied which consists of two carbon electrodes which are immersed in a six per cent chloride of sodium solution. A direct current of 11 volts and 18 amperes is applied for 15 minutes, which converts it into chlorine. If the same current is kept on after this it converts it into hydrochloric acid.

When these two instruments are combined the production and distribution takes place at the same time. The apparatus is constructed in three sizes as follows: One and one-half inch fan, 1,000 revolutions per minute; four inch fan, 1,500 revolutions per minute; and eight inch fan, 1,800 revolutions per minute.

London, O., has granted a franchise to Thomas H. Roland for a magneto-telephone system.

THE NATIONAL SCHOOL OF ELECTRICITY.

ITS OBJECTS AND METHODS OF WORK.

To the Editor of Electrical Review:

You have been good enough to notice the National School of Electricity in your columns. The business organization of the school is now completed and the work incident to the furtherance of its purposes is well under way. As the organization is an educational one in its broadest scope, I feel that you would be glad to have accurate information as to its plans and purposes, more detailed in character than has been given to the public up to this time.

Members of the faculty are now actively in the work of preparing the educational course. Every lesson after its preparation by some member of the faculty is sent to and is to have the approval of the other members before it is published.

The course is to be of a practical nature and the management of the school makes no promise to fit students for expert electrical service after taking the course. The prospectus issued states specifically that taking the course will not fit anyone for expert service. It is intended, however, to be sufficiently elementary and exhaustive to give students an insight into the science and to introduce them, as it were, to the subject in a way that will permit them to prosecute its study in an intelligent and comprehensive manner, and if taken in connection with either practical or theoretical work will be of vast aid to them in their attempt to master the subject. The course is to be practical to the extent that apparatus is to be employed in the demonstration of principles and in full explanation of theories and practice. The particular member of the faculty who writes a particular lesson, specifies at the end of the lesson the apparatus required and particularizes as to its use. The apparatus called for is to be invariably provided and employed.

It may serve you for fuller information in regard to the details of the operation of the school if I give you a few of the facts concerning the organization of classes in this city where a most promising commencement has been made. There are now organized for work nine classes in this city, and new classes are being organized almost every night. These classes contain from 30 to 75 members. They meet one evening in each week. We have employed for instructors young men thoroughly familiar with the theoretical side of the subject by virtue of college courses, and who have had practical experience in the laboratories and factories and in commercial positions in the large companies.

The best people, and those most competent to judge of the probable usefulness of this course, are actively interested in its success in Chicago and have made personal effort to that end. Bishop Fallows, whom it will not be necessary to introduce, gave the weight of his influence in behalf of the organization by presiding at a meeting for the organization of the first class. The management of the Armour Institute have supported the movement to the extent of identifying the school with the electrical department of that Institute by inviting the organization of a class in the Institute, and by active co-operation toward its success. Professor Stine, professor of electrical engineering of the Institute, will personally direct the course of instruction and will aid in every way to the success of the undertaking. I might go on indefinitely and name men who would be recognized as leaders in educational matters here who are in active support of the plans and purposes of the school.

It has been the intention to feel carefully our way before prosecuting the work of organization of classes outside of Chicago, with a view to the perfection of details. It is now the intention to vigorously prosecute the work in all of the States of the Union.

I have been thus particular in explaining to you, as nearly as I may in so brief a letter, some of the points about the National School of Electricity, because we believe that the school is entitled to the active and hearty support of everybody engaged in the electrical business, and everybody interested in the dissemination of correct views regarding electrical science, and especially of the electrical journals, those molders of opinion without whose support we would feel that the lines of thought actuating the men who organized this school were in error.

I beg to thank you again most heartily for your kind interest in the movement.

J. P. Barrett,
President and Member of the Faculty.

Chicago, May 30.

Bristol's Recording Wattmeter.

The accompanying engravings illustrate a new recording wattmeter that is being manufactured and introduced by the Bristol company of Waterbury, Conn., to supplement their present line of recording voltmeters.

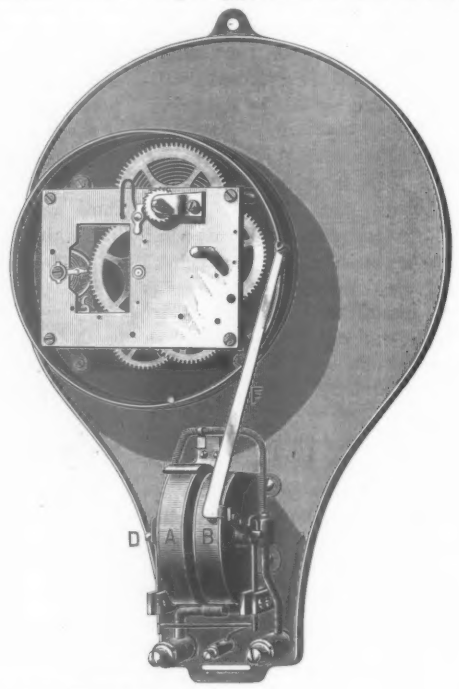
The general design of the wattmeter is the same as that of the voltmeter, the principal modification being that a coil wound with a heavy conductor is substituted for one of the stationary coils of fine wire. This method of adapting the recording voltmeter to a recording dynamometer or wattmeter was planned for and fully described in the specifications of the patent of the voltmeter.

Referring to the engravings, Fig. 1 shows the instrument complete, ready for connection. Fig. 2 shows the interior construction and manner of operation. The coil A wound with fine wire is mounted on spring knife edge supports and is free to move toward the stationary coil B, which is wound with a heavy conductor capable of carrying the entire current to be measured. The terminals of the coil A are connected to the positive and negative conductors, and the magnetic effect of the current through this coil of high resistance will be dependent upon the voltage, while the magnetic effect of the main current through the coil B of low resistance will depend upon the number of amperes passing. The mutual attraction of the coils will be the product of these magnetic forces and proportional to the number of watts.

The marking-arm F is attached directly to one of the knife edge spring supports of the movable coil and partakes of its motion, recording the variations of electrical energy on a uniformly revolving chart.

While the actual motion of the coil is quite small it will be seen that the angular motion of the pen-arm affords a sufficiently open scale on the chart without resort to ordinary multiplying mechanism which would introduce friction. As the only bearings in the instrument are the knife edge supports of the movable coil it is extremely sensitive to the smallest changes of current. The magnetic balance principle involved in the construction makes it possible to entirely avoid the use of permanent magnets.

The divisions on the chart shown are kilowatts with a total range of eleven kilowatts. The stationary coil is designed for a maximum current of one hundred amperes. For larger currents proportional shunts will be employed.



Figs. 1 and 2.—Bristol's Recording Wattmeter.

LITERARY.

"Proceedings of the Electrical Society of Cornell University" for 1894 have been received.

In *The Forum* for June, Mr. Morton, the Secretary of Agriculture, writes on "Farmers, Fallacies and Furrows," to show that the agricultural unrest is caused less by agricultural distress than by political and economic fallacies, by which a certain noisy proportion of farmers have been led away from their furrows.

One of the newest and most promising fields of electrical application is that which includes electrical boats and navigation. A great amount of successful work is already being done, and the record of it, as well as the outlook, is the subject of a book about to issue from the press of C. C. Shelley, New York city. The author is Mr. Thomas Commerford Martin, editor of the *Electrical Engineer*, New York, whose recent volume on the researches of Nikola Tesla has been so well received. Mr. Martin's book on the electric motor and the electric railway, published a few years ago, has run through several editions, and it is believed that this new book will be not less interesting and useful, especially as single boats and fleets are being started in all directions. The book will include primary battery boats, storage battery boats, screw and paddle wheel boats, row boats, gigs, pinnaces, catamarans, torpedo boats, submarine boats, dirigible torpedoes, lightships, ferry boats, etc. It will also include some chapters, by Mr. Joseph Sachs, on the operation of canal boats by electricity in a variety of ways, and there will be other chapters on boat haulage by magnetic adhesion, etc. The book will be profusely illustrated.

The electric light plant at Bloomington, Ill., is in operation again, the city engineer having purchased all the hard coal in the city to be used in keeping the lights burning.

Arrangements have been made by the K. and I. Bridge Company and New Albany Street Railway Company with the New Albany, Ind., Light, Heat and Power Company to furnish electric power to propel the trolley cars. Up to May 1 the street railway had been operated with power from the New Albany power house and bridge trains from the Louisville power house. Since May 1 the New Albany power house has been cut out and the street cars were propelled by power from Louisville. The Light, Heat and Power Company will at once order two new engines and erect an addition to its power house.

Electrical Apparatus for Purposes of Instruction.

The Scientific Machinist Company, 92 and 93 Atwater building, Cleveland, O., proprietors of the Institute for Home Study of Electricity, are the manufacturers of the electrical apparatus for purposes of instruction illustrated herewith. While this apparatus was designed especially for the students of the Institute, it will soon be placed on the general market. Patents on the various features of the apparatus have been applied for.

The Lincoln-Amstutz experimental one-fourth horse-power dynamo and motor is illustrated in Fig. 1. This machine is of the ironclad type, with poles projecting radially toward the centre.

It is fitted with self-oiling bearings of ample size, adjustable brush holder, two sets of copper brushes, and is in every respect a practical machine. In addition to the machine, as above, there are sent four insulated rings, which may be secured and connected to the commutator for alternating current working. By the use of only one size of wire on field and armature the machine may be variably connected as follows :

1. As a four-pole shunt wound dynamo delivering direct current at constant potential—two brushes only.
2. As a four-pole compound wound dynamo arranged so that the voltage rises as the load is increased—two brushes only.
3. As a series four-pole dynamo—two brushes only.
4. By changing the connections of the armature bobbins to the commutator we may cause the machine to furnish twice the current at half the voltage. Connected in this way the machine will operate as a four-pole shunt wound dynamo giving direct current at constant voltage—four brushes.
5. Also a series dynamo giving twice the current at half the voltage—four brushes.
6. As a four-pole shunt wound motor running at constant speed, corresponding to case 1.
7. As a four-pole compound wound motor where the speed will drop when the load comes on, corresponding to case 2.
8. As a four-pole compound wound motor where the speed rises when the load comes on, corresponding to a variation of case 2.
9. As a four-pole series motor, corresponding to case 3.
10. By changing the connection and using four brushes we get a four-pole motor running at twice the speed it did before changing and running at double speed and double power, corresponding to case 4.
11. As a four-pole series motor operating at twice the speed it did before the change corresponding to case 5 was made.
12. By rewinding the armature we have a two-pole shunt dynamo.
13. Corresponding to 12 we have a bipolar shunt motor.
14. A bipolar series dynamo.
15. A bipolar series motor.

In all the above cases the machines are self-excited, and a large number of changes could be made by various combinations with separately excited fields, a number of which are outlined as follows :

16. By the use of two of the insulated rings we may have a four-pole alternating current single phase dynamo.
17. Corresponding to this we have a four-pole single phase synchronous motor.
18. By changing the armature winding again we may have a two-pole single phase alternating current dynamo.
19. And corresponding to this a two-pole single phase synchronous motor.
20. By the use of four of the rings we may have a two phase four-pole alternating current dynamo.
21. By an adjustment of the rings a four-pole three phase alternating current dynamo is procured.
22. Corresponding to case 20 we have a two phase alternating current motor.
23. Corresponding to case 21 we have a three phase alternating current motor.
24. By the use of the two-pole armature winding we may get a two phase two-pole alternating current dynamo.
25. Also a three phase two-pole alternating current dynamo.

In all cases when the machine is used as an alternating current dynamo or motor, the fields will have to be separately excited. The armature and field coils winding may be made with larger or smaller wire than is sent with the machines so as to employ higher or lower voltages and more or less current. The machine is very well adapted for a two or four-pole plater. In connection with the machine, instruction diagrams of field and armature windings and connections are given which make possible the above mentioned variations.

The volts and current produced by a winding of various sizes of wire is also given. More can be learned about the volts and current produced by a dynamo by making the changes required to transform this machine than in any other way. Some suggestions for an inexpensive foot-power device will be sent with every machine, for those who have no power with which to drive a dynamo.

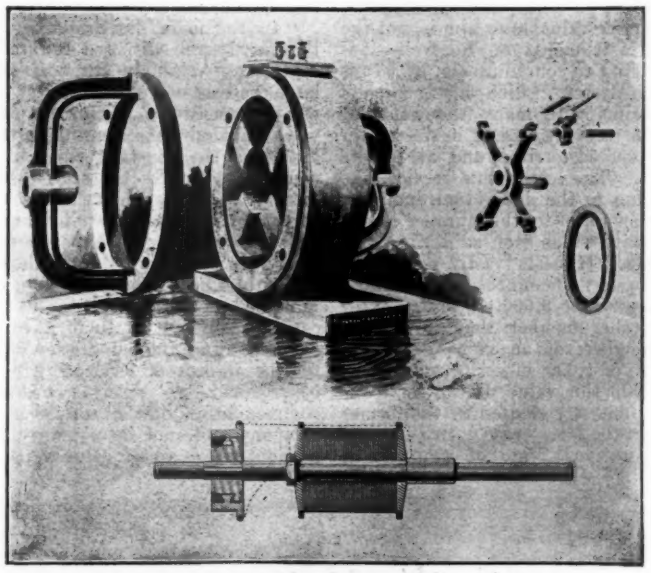


FIG. 1.—LINCOLN-AMSTUTZ EXPERIMENTAL DYNAMO.

In the combination-measuring instrument shown in Fig. 2 an annealed soft iron core is drawn into a magnetic field obliquely. To accomplish this the spool on which the coils are wound is made with an oblong opening, the height of which is four or five times its breadth. This allows the core the necessary freedom of motion. By the proper adjustments the direct reading scales can be made quite uniform from one end to the other. It will be seen that there are no multiplying devices to get out of order, the only motion being the movement of the core and pointer on their support. The instrument is wound with two coils, one of fine wire and the other of coarse.

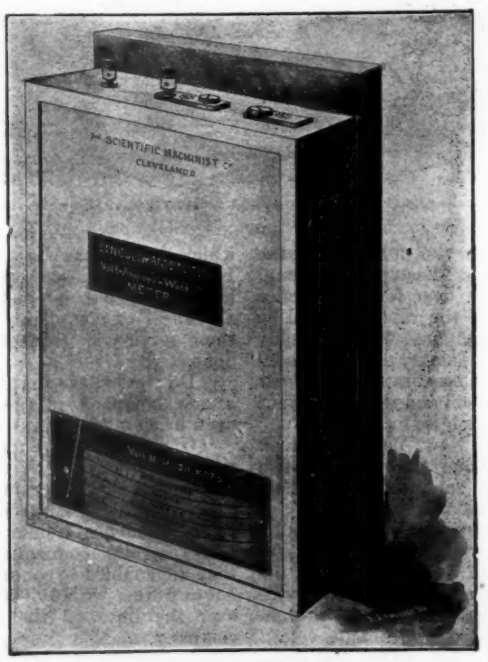


FIG. 2.—COMBINED EXPERIMENTAL MEASURING INSTRUMENT.

The coarse wire is connected between the two large terminals and the small wire between the small binding post and the large one next to it. The four scales are obtained from the two coils in this manner.

1. The ammeter scale is calibrated with a Weston ammeter in series with the coarse wire coil.
2. The voltmeter scale is calibrated with a Weston voltmeter in parallel with the fine wire coil.
3. From the known resistance of the fine wire coil and the volts at its terminals, the fractional part of an ampere in the fine wire coil is found and given on the scale of milliamperes.
4. Both coils are connected to the circuit at the same time, a wire from one side being lead to the middle binding post ; the current then flows through the coarse wire coil to the lamps and to the other side of the circuit. Another wire from the small binding post is carried to the other side of the circuit, so that the fine wire coil is in parallel with the coarse wire coil and the lamps, and is subject to the same voltage as the lamps. Both the fine and coarse wire coils tend to draw in the iron core, and by proper calibration the watts are read.

ELECTRIC LIGHT FLASHES.

The Lambertville, N. J., electric light plant is advertised to be sold at sheriff's sale on June 18.

The Edison Illuminating Company, of St. Louis, is adding several power generators to its plant to meet an increasing demand.

The cylinder head of an engine in the electric light plant at Elkton, Md., blew out last week, causing a shut-down for several days.

The electric light company at Terre Haute, Ind., last week began to use crude oil for fuel because the coal supply in the vicinity was exhausted.

The Common Council at Oshkosh, Wis., adopted a resolution in favor of municipal ownership of an electric light plant, receiving 11 ayes to seven nays, but Mayor Oellerich ruled the resolution lost, it requiring 12 votes to pass.

An unusual accident recently occurred near Alta, Mont. A construction train on the Montana Central Railroad having a pile driver attached came along and it seems that the driver was hoisted instead of lowered, and when passing under the electric wires used by the Alta Mining Company, tore the wire down, jerked out several poles and also tore out the dynamos at the mill. The mine had to be closed down pending repairs.

On May 26 the city of Hawarden, Ia., awarded the contract for its incandescent electric lighting plant to J. H. Winchel, Le Mars, Ia., under plans and specifications prepared by William H. Bryan, consulting engineer, St. Louis. The contract covers a 36 kilowatt slow speed Thomson-Houston alternator, a 12x30 Corliss engine, two 80 horse-power steel boilers, primary and secondary construction for 1,000 sixteen candle-power in-door lights and fifty 32 candle-power street lights. The work is to be finished within 90 days, but the plant will probably be running much sooner. Owing to the very favorable cash terms offered, this contract was placed at very low figures.

TELEPHONE RATES AND SERVICE.

GENERAL MANAGER WILLIAM D. SARGENT, OF THE NEW YORK AND NEW JERSEY TELEPHONE COMPANY, GIVES HIS VIEWS ON TELEPHONE MATTERS IN BROOKLYN, N. Y.

A reporter for the Brooklyn, N. Y., *Eagle* recently called upon Mr. William D. Sargent, general manager of the New York and New Jersey Telephone Company, in reference to the veto, by Mayor Schieren, of the ordinance granting permission to the New York and Eastern Telephone and Telegraph Company to construct its lines and lay wires for a telephone system in Brooklyn. In answer to the reporter's questions, Mr. Sargent said:

"That he had been, on the whole, surprised that the Mayor had vetoed the ordinance; he believed the grounds upon which Mayor Schieren based his veto to be both sufficient and wise and that the Mayor's action had met with general approval; but, on account of the broad promises of lower telephone rates, which had been held out, and of the popular demand for cheapness, Mr. Sargent had been inclined to look for an approval of the ordinance."

"Did your company oppose the granting of a franchise to the new company, Mr. Sargent?"

"Not at all; we naturally are not anxious for competition, but we cannot fairly or reasonably object to the granting of such privileges as we possess to any other honest business enterprise upon equal terms."

"It was stated in a local journal that your company had been invited to attend the hearing before Mayor Schieren upon the New York and Eastern's application, but that it disregarded the invitation."

"That was not so. His honor asked us if we desired to be heard on the matter and we said 'No.' We expressly told the Mayor that we should interpose no opposition and could only ask that he assure himself, so far as possible, that the franchise was sought for legitimate business purposes and not for speculation. The city cannot afford to give valuable franchises to be used speculatively and without the return of an adequate service to the public."

"Mr. Sargent, it was stated at that hearing, by the counsel for the new company, that your company made a profit, last year, in this city, of $464,791.83, and that your plant in this city represented but about $240,000. How about that?"

"Both statements were untrue, so much so as to be absurd. They were made with reckless disregard of the facts and had not even the excuse of ignorance. The person who made the statement took from our last annual report the total amount of this company's earnings above operating expenses in our entire territory, both in the States of New York and New Jersey, covering all of Long Island, Staten Island, and the large cities of New Jersey, and gave these as our profits in the city of Brooklyn! Not only this, but he omitted to mention that from this amount, as our printed report clearly showed, there was deducted $97,415 for taxes paid by this company in the two States, and for interest on our bonds, before arriving at profits. For the assertion that our plant in Brooklyn represented but $240,000 there was no possible foundation; it could not be duplicated for five times that amount.

"How about the reduced rates at which the New York and Eastern company proposes to furnish its telephones, $75 to the public generally and $40 to the city?"

"In the telephone business, as in most others, the matter of price is a relative and not an absolute one. Whether a service is cheap or not depends upon its value to the subscriber and that depends entirely upon the quality and extent of the service afforded. That which a telephone subscriber pays for and which makes the service valuable to him is not the set of instruments on his wall—it is the ability to communicate, by means of the system which his company maintains, with many thousands of persons in every class of business over a widespread territory and at remote points. The cost of this service, like its value to the individual, increases in direct ratio to the number of stations with which each subscriber can connect. It costs vastly more, proportionately to connect each member of a system of 5,000 subscribers with every other member than to connect the members of an exchange of 100, or even of 1,000 subscribers together, but then the value of the service is also immensely greater in the former than in the latter case. In this way, you perceive, a rate of $75, such as that proposed in the ordinance of the New York and Eastern company, might be very dear for the service rendered, while the rates charged by the present company, while in many cases not much larger, might be considered very cheap in view of its 10,000 subscribers and the wide extent of territory which its lines cover."

"Does the New York and New Jersey Telephone Company furnish any service at rates as low as those proposed by the other company?"

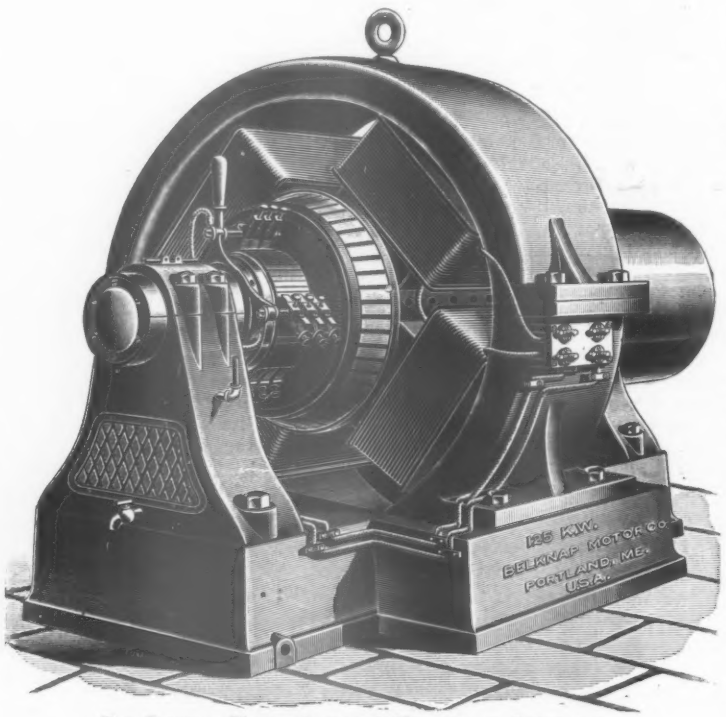
"Yes, we furnish the best metallic circuit service as low as $75 per station, and at still lower rates—and the city is receiving some of its service from this company at less prices than those named in the ordinance vetoed by the Mayor. Of course, the question of cost to a subscriber depends mainly upon the quality and amount of the service desired. As a general rule, the larger the use, the greater the cost, although with increased use the rate per message is proportionately lower. When you compare the telephone message with the telegram and reflect how much speedier, more effective and more satisfactory is the telephone communication than that of the telegram, and then compare the average cost of the two messages, you can form some idea of the immense value of the telephone as an agency of communication in our busy and complex commercial and social life."

"What do you believe to be the attitude, Mr. Sargent, of your subscribers, generally, toward the telephone company?"

"In the main our subscribers are thoroughly well disposed toward the company. While in any business as large and as complex as ours there will be numerous causes for complaint, yet I think our subscribers understand that it is the constant effort of the company to make the service satisfactory and to remove causes of complaint or dissatisfaction wherever that is possible. We have comparatively few complaints from those of our subscribers who are using the improved metallic circuit service, and over 70 per cent of them have now changed from the old ground circuit to the improved service. On the other hand, we receive constantly commendation of the service of the company and, not infrequently, suggestions which are of value to us and which the company is glad to adopt. I think our subscribers understand that it is to our interest to eliminate all causes of complaint and to make their service as perfect as can be done."

"Do you believe that the advent of a new company in the field would draw away many of your subscribers?"

"Of course, it is impossible to tell what may happen in the future in any case, but, in my judgment, our subscribers fully appreciate the value of the immense system of this company and its connections, whereby they are enabled to communicate over our own lines with 10,000 subscribers; over the lines of the Metropolitan company, in New York, with 10,000 more subscribers; and through our relations with the Long Distance company and the American Bell companies throughout the country, with 100,000 subscribers in the United States. I do not believe many of them would be so unwise as to surrender these facilities for the privilege of joining a small local exchange, even at a very much larger difference in the cost of the service than that which is now proposed."



THE BELKNAP MOTOR COMPANY'S MULTIPOLAR GENERATOR.

The Belknap Multipolar Generator.

The Belknap Motor Company, of Portland, Me., is one of the concerns that is crowded with orders, and, notwithstanding the hard times, is building a large addition to its factory preparatory to going into the manufacture of large railway generators and motors.

We herewith illustrate the new Belknap multipolar generator which that enterprising company has just put on the market. The frame of the machine is made up of several parts, making it convenient to handle. The total weight is quite uniformly divided between the several parts, making a very convenient machine to set up in stations which are not provided with apparatus for holding very heavy weights. The bed is planed to fit iron slides, and is very rigidly constructed so as to withstand the strain brought on it by the weight of the field magnet.

The magnet consists of two iron castings, the two together forming a complete circle, with four inward projecting cores to receive the field coils. The magnet is bored and fitted with a pole bushing surrounding the armature, which gives the greatest possible effective polar arc and prevents the disagreeable humming sometimes observed with toothed armatures under heavy loads, and suppresses the tendency to spark by reason of stray lines of force.

The armature is of the toothed, hollow drum type. By a system of end connections, crossing of the conductors at the leads of the armature is avoided, which reduces the danger of burn-outs, and every wire can be got at conveniently.

The commutator is massive, and the Belknap woven wire and graphite brushes are used. The bearings are very large, and are self-aligning and self-oiling. The two terminals are located at opposite sides of the machine to avoid the danger of a short circuit.

The field cores are compound wound, and the magnetic circuit of the machine is carefully designed with reference to the reluctance of cast-iron, wrought-iron and air so as to get the very best attainable effect from the materials involved.

The home office of the Belknap Motor Company is at Portland, Me., and branch offices are located in New York, Boston, Philadelphia and Washington.

A Good Bicycle.

The Columbia Carriage and Cycle Company, Milwaukee, are extensively advertising one of the best all round road wheels on the market. Having made arrangements to build an immense quantity of them this year, and wishing to get them more thoroughly introduced, they have made a net price to consumers that is lower than the same grade of wheel can be sold on a wholesale basis. This is a splendid opportunity to secure a high grade American wheel at a great reduction, and in getting it from a reliable house, who furnish written guarantees with their wheels, you can depend upon getting your money's worth.

TELEPHONE NEWS AND COMMENT.

Dr. S. N. Frank is securing subscribers for a new telephone exchange at Carlisle, Pa.

Those rival telephone companies don't seem to be doing much to down the monopoly, as yet.—*Boston Globe.*

The Committee on Finance, Boston, reported adversely on the bill to establish a State telephone commission.

The Mutual Automatic Telephone Company, with $200,000 capital stock, has filed articles of incorporation in Camden, N. J.

The press of New York city quite generally approves of the new schedule of telephone rates announced by the Metropolitan company.

informed on Bell telephone affairs intimate that the new stock of the American Bell Telephone Company will come out in $5,000,000 blocks.

The bill authorizing the American Bell Telephone Company to increase its capital to $50,000,000 has been ordered to a third reading by the Massachusetts House. It will in all probability soon become a law.

The new telephone company at Parkersburg secured the passage of a favorable ordinance through the City Council. Wheeling will have a new company which will ask for the same thing within a very short time.

The Bellevue, O., Mutual Telephone Company has been incorporated; capital, $12,000. The Norwalk, Ohio, Telephone Company has also been incorporated with capital of $20,000. The Harrison system is to be used.

cent of its paid-up capital stock. As this is $2,500,000, the new issue would amount to over $1,700,000.

Mr. Amy (in telephone office)—"Will you please call up Miss Marybone and deliver a message for me?"

Operator—"Wouldn't you like to speak with her yourself?"

Mr. Amy—"Oh, no, no! I—the fact is—I dined with an Italian friend and one course consisted of garlic."—*Judge.*

Officers of the Missouri and Kansas company are trying to have a long distance circuit extended from Chicago to Kansas City so as to connect the subscribers there with the long distance system, and it is safe to say that soon after these lines are finished to St. Louis local business men will be able to talk direct to Chicago and the East and intermediate cities. The company now has about 1,300 miles of toll lines radiating from Kansas City

PRES. MULVANE. TREAS. FERGUSON. SUPT. MCDANIEL.

ATTENDANTS AT THE FIRST CONVENTION OF EMPLOYEES OF THE MISSOURI AND KANSAS TELEPHONE COMPANY, KANSAS CITY, MO., MAY 24TH AND 25TH, 1894.—FROM A PHOTOGRAPH BY HARRY MCDANIEL.

Running a telephone exchange for 500 subscribers is one business and running an exchange for 5,000 subscribers is another and an entirely different business.

The new Citizens' Telephone Company, of St. Joseph, Mo., is reported short of funds. Workmen are said to be getting impatient waiting for a pay day that cometh not.

The Wheeling, W. Va., Telephone Company has organized. The name of Chas. Selden, the well-known electrician, appears among the directors; J. J. Woods, of Wheeling, is president.

A new telephone line between Paris and Havre is being strung. This makes three. Passengers from America can telephone on landing and engage rooms at the Continental Hotel, Paris.

The financial writer of the Boston *Advertiser* says that persons well

Racine, Wis., is to have plenty of competition in the telephone business. The Wisconsin Telephone Company has had the exclusive monopoly there for years. Now three different companies are after a franchise to put in a new plant.

Up to the present the telephone people at Minneapolis, Minn., have come out ahead in their fight with the aldermen on the question of reduction of rentals. Under their charter it seems that the city does not have the authority to regulate charges.

The electric street railway company and the long-distance telephone company are having a dispute over rights of way in Delaware, O. The street railway company secured an injunction and stopped the telephone people from planting poles.

The Bell Telephone Company has a bill before the Canadian Parliament which gives it authority to issue bonds or debentures to the amount of 75 per

to the principal towns in Missouri and Kansas, with branches extending into Southwestern Iowa. These lines have nearly all been rebuilt recently. They are equipped with the latest improved apparatus and the service over them is very satisfactory.

Not long ago the keeper of a large restaurant in Kansas City quarreled with the company and ordered his telephone taken out. Then he used a neighbor's telephone, but the girls at central had their instructions, and when he called up some of the houses that he dealt with they were on the watch. He would say, "Is this Jacob Dold's?" "Well, this is ——." The name was the last word that Dold heard. It made no difference whether he gave his name at the beginning of the conversation or later, for the moment a hint was given that he was talking or that some one was talking for him the connection was broken and he talked into the switchboard. He tried every telephone near and finally gave up and is now a subscriber.

First Convention of the Missouri and Kansas Telephone Company's Employees.

A convention of the employees of the Missouri and Kansas Telephone Company was held at the general office in Kansas City, Mo., on Thursday and Friday, the 24th and 25th of May. The two days were spent in discussing subjects pertaining to the telephone business under the following heads: Management, construction, operating, apparatus.

Among the most interesting subjects discussed were the central office discipline, economical exchange management, from what causes do most complaints from subscribers arise, the use of telephones by non-subscribers, methods of testing exchange lines, methods of locating grounds on tap circuits, the care of dead exchange wires, how should precedence of toll calls be determined, uniform method of answering subscribers, what is the most reliable battery for use at toll stations and how can subscribers best be taught to use the telephone properly.

This was the first convention held by the company. It proved a great success and will undoubtedly be made a permanent feature, and at least one, if not two, meetings will be held each year. The boys were entertained at the Midland Hotel and were taken in a body to the Coates Opera House Thursday evening. The theatrical company were given "tips" and they made many personal hits that were pleasing.

Friday morning President Mulvane addressed the convention, giving the boys wholesome advice. Below is a list of those present:

J. R. Mulvane, president; A. Burt, general manager; N. R. Ferguson, treasurer; Chas. W. McDaniel, superintendent; H. W. Bellard, auditor; C. T. Carll, Kansas City; J. O. Stockwell, St. Joseph, Mo.; Pat. O'Brien, Leavenworth, Kans.; Allen Lee, Atchison, Kans.; Sidney Phillips, Lawrence, Kans.; Geo. Bayless, Topeka, Kans.; H. G. Chipchase, Wichita, Kans.; E. B. Marmaduke, Ottawa, Kans.; F. C. Simpson, Oklahoma, O. T.; C. A. Cook, Hannibal, Mo.; J. B. Allen, Hutchinson, Kans.; W. M. Jewett, Joplin, Mo.; F. W. Mackey, Sedalia, Mo.; J. W. Wilson, Arkansas City, Kans.; Albert Barret, Bert Halderman, Joe Zentner, Otis Carter, S. C. Pettit, Kansas City; R. W. Stockwell, J. B. Scott, St. Joseph, Mo.; J. R. Phelps, Great Bend, Kans; J. H. Flinn, Kansas City; B. W. Strafford, Boston, Mass.; J. C. Tanper, Harry McDaniel, Kansas City.

A Revival of Work at the Ball & Wood Engine Works.

The business of the Ball & Wood Company has so far recovered from the general business depression that they find it necessary to increase their force by the addition of a night gang. Beginning last week, their works at Elizabeth, N. J., will be run to its full capacity, 24 hours a day, which speaks well for the reputation of the company's engines.

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CONTENTS.

	PAGE
Views, News and Interviews	273
Thirteenth Annual Exposition of the American Street Railway Association	273
The Association of Railway Telegraph Superintendents	273
Plumb's Electric Atomizer and Disinfecting Apparatus	273
The National School of Electricity	274
Bristol's Recording Wattmeter	274
Literary	274
Electrical Apparatus for Purposes of Instruction	275
Electric Light Flashes	275
Telephone Rates and Service	276
The Belknap Multipolar Generator	276
A Good Bicycle	276
Telephone News and Comment	277
First Convention of the Missouri and Kansas Telephone Company's Employés	277
A Revival of Work at the Ball & Wood Engine Works	277
Benefits Conferred by the Electric Railway	278
Electricity Fires and the Press	278
Correspondence:	
Our Chicago Letter	279
Our Boston Letter	279
General Notes	279
Personal	279
Wall Street and the Electrical Stock Market	279
John Ridall Sues the Brush Company	279
Electric Railway Notes	280
Notes of Interest	280
The Card Electric Company's Single Motor Equipments for Street Railways	280
The Johnson-Lundell Railway System to be Tried in New York	280
Brooklyn Electrical Society	280
Lighting of the Mid-Winter Fair	281
Telephone Message Rate	281
General Electric Company's Ironclad Motor Hoist	282
Electrical and Mechanical Engineering and Trading Company	282
Alternating Current and Fuses	282
Electrical Patents	284
Advance Information	284
Kindred Interests	x

INDEX OF ADVERTISERS.

COVER PAGES.

	PAGE
Abendroth & Root Mfg. Co	xvi
American Electrical Works, insulated wire	i
Ansonia Brass & Copper Co., wire	xvi
Armington & Sims, engines	xvi
Beacon Vacuum Pump and Electrical Co	i
Bunnell & Co., J. H	i
Campbell Electrical Supply Co., insulating tape	i
Day's Kerite, insulated wire	i
Eastern Electric Cable Co., insulated wire	xvi
Eddy Electric Mfg. Co., motors	i
Goubert Manufacturing Co., Stratton separators	xvi
Hampson & Co., E. P., engines	xvi
Holtzer-Cabot Electric Co	xvi
Manhattan Electrical Supply Co	i
McKenney & Waterbury	i
National India Rubber Co	i
Okonite Co., insulated wire	i, ii a xvi
Royal Arc Electric Co	i
Stirling Co., boilers	xvi
Underwood, F. H	i
Weston Engine Co., engines	i

INSIDE PAGES.

American Bell Telephone Co	iv
American Carbon Co., carbons	viii
Baker & Co., platinum	x
Berlin Iron Bridge Co., iron roofs and buildings	xiv
Bishop Gutta Percha Co	v
Brixey, W. R., wire and cables	viii
Brush Electric Co	vi
Buckeye Electric Co., incandescent lamps	viii
Buckeye Engine Co., engines	ix
Butler Hard Rubber Co	xi
Case Engine Co., The J. T., steam engines	ix
Central Electric Co	iii
Clark Electric Co., arc lighting	iv
Clonbrock Steam Boiler Works	v
Connecticut Pipe Mfg. Co	iii
College of Engineering	x
Columbia Carriage and Cycle Co	x
Consolidated Electric Storage Co	vi
Correspondence School of Electricity	x
Correspondence School of Technology	xii
Correspondence School of Mechanics	x
Day-Moberg Electric Co	xiii
Dixon, Jos., Crucible Co., belt dressing	v
Edson, Jarvis B	vii
Electric Construction and Supply Co	iii
Electrical and Mechanical Engineering and Trading Co	ix
Electric Storage Battery Co., accumulators	xiii
Empire China Works, porcelain specialties	iv
Equitable Life Assurance Society	vi
Falls Rivet & Machine Co., friction clutches	xiii
Faraday Carbon Co., carbons	v
Fidelity Carbon Manufacturing Co., carbons	iv
Garvin Machine Co	iii
General Electric Co	vii
General Electric Launch Co., electric launches	x
General Incandescent Arc Light Co., arc lamps	xi
Gooch, Chas. J., patents	x
Greeley & Co., The E. S	xiv
Harrisburg Foundry & Machine Works, engines	vi
Harrison International Telephone Co	iv
Hathaway Office Building	x
Hornberger Electric Mfg. Co	ix
Hulbert Fence and Wire Co	iv
Johns Mfg. Co., H. W., vulcabeston	ix
Leffel & Co., James, water wheels	xiv
Lehigh Valley Creosoting Co., creosoted lumber	x
Leonard & Co., H. Ward	x
Marshall, Wm., condensers	iv
Moore, Alfred F., wire	ix
Morris, Tasker & Co	xiii
National Pipe Bending Co., feed-water heater	ix
New England Engineering Co	iii
New York Belting and Packing Co., rubber belts	iv
New York Insulated Wire Co., wires and cables	xiii
New York & New England R. R	iii
Ostrander & Co., W. R., supplies	vi
Palmer Bros., telephones	284
Pettingell-Andrews Co	xiv
Phillips Insulated Wire Co	viii
Phoenix Glass Co., globes	v
Photo-Engraving Co., engravings	iv
Pope, Read & Rogers	x
Queen & Co., electric dynamometer	ix
Ritchie, E. S. & Sons	x
Robinson & Orr, steel rails	vi
Rose Polytechnic Institute	x
Royce & Marean, electrical supplies	vi
Schieren & Co., Chas. A	x
Scientific Machinist Co	x
Shiffler Bridge Co	284
Siemens & Halske Electric Co	xi
Splitdorf, C. F	284
Standard Paint Co	viii
Wallace Electric Co	ix
Western Electric Co., supplies	iv
Western Telephone Construction Co	iv
Westinghouse Electric & Manufacturing Co.	v
Weston Electrical Instrument Co., measuring instruments	viii
White-Crosby & Co., contracting engineers	x
White Dental Mfg. Co., acid gravity battery	vi
Wyckoff Pipe Co., inc	ix

Electrical business men, as well as others, are about tired of this prolonged contest between General Humidity and General Depression.

A prominent electrical supply house in the West is expressing in printer's ink every week the universal cry of the trade: "What we want is orders!"

When that revival of business gets here in its entirety it will be well for it to be a healthy, hearty thing, for it will be subjected to the most affectionate and universal reception ever accorded an article of that kind.

The builders of modern apartment houses are evidently constructing them with a view to the adoption of electric cooking apparatus in the future. We know of one apartment in New York city which has a kitchen three and one-half by four feet, now occupied by a gas range. Such a kitchen certainly is meant to be occupied by an electric stove.

BENEFITS CONFERRED BY THE ELECTRIC RAILWAY.

The electric railway is one of the best friends of the man of moderate means, the man who belongs to that class which forms the majority of the 44 per cent of this country's population which makes its home in cities.

This man of moderate means is usually called upon to spend a third of his income for rent. He must live in the city in order to be near his business. He is forced to raise his children in the city, often under very undesirable circumstances. He cannot give his family the many benefits of country or suburban life, because he must earn money so that they may all live; to earn money he must work; to work satisfactorily he must have his home convenient to his business—therefore, as the majority of occupations are carried on in the cities, he must, perforce, live in a city. But with the constantly increasing number of suburban and interurban electric railways, this state of affairs is being more pleasantly adjusted. By using the electric railway this man can live miles out of the city and be within the same number of minutes of his business as he is now in the city. When he is miles from his business he is in the country or suburbs, where he has the advantage of cheaper rent, pure air, good environments for his family, and much else his heart craves. If he moves miles from the city he leaves vacant his former home. If his neighbors do the same, there are many vacant houses, and the landlord must reduce his rents in order to collect any. Thus, substantial benefits accrue to those who must live in cities. These are simple and logical facts, and their truth is being demonstrated daily.

ELECTRICITY FIRES AND THE PRESS.

When Dr. Talmage's Brooklyn Tabernacle was destroyed by fire a short time ago the daily press immediately set down the cause to the credit of electricity, simply because electrical apparatus was used in the operation of the organ. Assistant Fire Marshal Robert F. Rice, who has just completed an investigation of this matter, says in his report that he believes the fire was caused by carelessness on the part of the organ adjusters. He says it is his opinion that they left somewhere in the organ a lighted candle, which burned down and set fire to some projecting bit of wood or paper. We commend these remarks to the attention of the daily press, and especially to the Syracuse, N. Y., *Courier*, which recently published a weak attempt at sensationalism in reference to defective wiring in Syracuse and the danger of fire from this cause. The article referred to consisted of scare heads, a reprint of the insurance requirements for wiring, and three or four interviews with Syracuse electricians, who were decidedly noncommittal in their opinions. In the face of the many reliable statistics published on the subject it shows a sad lack of editorial judgment on the part of our daily contemporaries to indulge in such puerile attempts at sensationalism as this. The time for doing this kind of thing has long since passed. Electrical contractors were never held up to such high requirements in their work; the rules were never so rigid, and the fires due to electrical causes were never so few as at present.

One C. C. Shayne, furrier, sailed from New York for Europe a few days ago and announced pompously that he intended to investigate the telephone system of that far-off country and bring back all the improvements and urge their adoption here. Mr. Shayne will only find the telephone system in European countries approaching our own in effectiveness where American apparatus has been adopted—notably in Germany and Sweden. Mr. Shayne was evidently talking through one of his fur hats.

We are informed that an attempt will soon be made to revive the New York Electric Club. The gentlemen who have assumed the task are cognizant of the difficulties which caused the collapse of the old club, and if their present ideas are carried out, such steps will be taken as to insure the success of the new organization. We should like to see an electric club in New York city based on correct principles.

Turpin, the French inventor who makes such fearfully destructive war apparatus, has apparently eclipsed all his former efforts in this direction. *Le Temps* announces that he has just completed an electrically operated automatic mitrailleuse capable of discharging, at a minimum, 25,000 projectiles four times in 15 minutes This would seem to be a good apparatus for killing anything—especially criminals.

There are too many trolley accidents in Brooklyn—too many deaths of children, caused by the rapid-moving cars. Mayor Schieren is consulting with the presidents of the roads in the hopes of putting a stop to these terrible catastrophes.

Prepare for the hot days by putting in an electric fan.

CORRESPONDENCE.

OUR CHICAGO LETTER.

Mr. Charles T. Yerkes has declined to accept certain ordinances recently passed unless the provision requiring free transportation of letter carriers is eliminated.

Dr. T. C. Mendenhall, chief of the Government Bureau of Coast and Geodetic Survey, has declined the presidency of the Rose Polytechnic Institute, a position he held prior to accepting the government office.

The North Chicago Railroad Company is reported to be earning an average of $700 a day in excess of the earnings of 1892. If true, this indicates that much of the professed dislike to residing in the Northern section of the city exists only in the minds of a few biased persons.

Ordinances have been passed authorizing the construction of electric railway lines on Fullerton avenue from Clark street west to Milwaukee avenues, and on Armitage avenue between California and Columbia avenue. A proposed road known as the Northern Electric Railway will connect Cragin with the elevated road.

The United States Government building at Duluth will be wired by the Crowley Construction Company, who will use brass and iron armored interior conduit throughout, purchasing the same from the Central Electric Company. The latter company is also supplying I. H. Moses with the brass covered conduit which was specified for use in the Garfield building in Cleveland.

The Chicago branch of the American Institute of Electrical Engineers met at Armour Institute, Wednesday evening, and listened to the reading of Mr. Alexander Jay Wurts' paper on lightning arresters. More than 100 members and guests were present and there was standing room only for the late comers. Messrs. Abbott, Arnold, Caldwell, Haskins, Kammeyer, Pierce and others participated in the discussion.

Trade may be dull in some lines of business, but the head of what is known as the largest electrical supply house in the country recently stated that their sales of interior conduit for the past three months exceeded the sales of last year by nearly 100 per cent, and that the increase in the total volume of business transacted was nearly as great. This information coming from so reliable a source is most gratifying and indicates the popularity and esteem in which this well-known house is held by the purchasing public. F. DE L.

Chicago, June 2.

OUR BOSTON LETTER.

There is probably no concern in Boston to-day who can point with just pride to the remarkable growth of their business during the past year, in spite of the general depression in all lines of trade, as can the W. S. Hill Electric Company. They have been devoting special attention recently to switch and switchboard work, and it is in this line particularly that the phenomenal increase in their business is most apparent. During the past Winter they have built and shipped some of the largest special switches ever manufactured, and the general excellence of their work has brought them the business notwithstanding the strong competition met with, and the fact that their prices were in most instances among the highest submitted. During the past nine months their facilities have been taxed to the utmost capacity to keep abreast of their orders, and for a portion of the time night work has been a necessity. An idea of the bulk of their business may be gathered from the fact that among the orders shipped last month were two for special switches to one concern that weighed over 11 tons. That this is not entirely exceptional is shown by the increase in their gross sales, which for the past nine months average nearly 75 per cent more than for the corresponding months of a year ago. This is the kind of news we like to hear, and should bring encouragement to other manufacturers in the electrical trade.

Boston, June 2. H. G. T.

GENERAL NOTES.

The annual meeting of the Fort Wayne Electric Company will be held in Fort Wayne, Ind., on Saturday, June 9.

John H. Dalzell, of Pittsburgh, Pa., died on May 27. He was one of the founders of the Standard Underground Cable Company and a director of the company at the time of his death. He was also president of the Pittsburgh and Manchester Traction Company and had been prominently interested in street railways since the introduction of the electric system in Pittsburgh.

The Missouri & Kansas Telephone Company recently celebrated the opening of its new lines from Kansas City to Leavenworth and Atchison. The citizens assembled in each city and listened to music and speechmaking. W. W. Smith of the company and Thos. D. Lockwood of the American Bell Company, delivered addresses, and Superintendent McDaniel sang a song. Everybody was pleased.

E. S. Karoly, the head of the firm of Karoly & Sockman, in the Monadnock building, Chicago, and C. S. Karoly, his brother, a manufacturer of electrical machinery in Aurora, Ill., are reported to be heirs to an estate of $2,000,000 in Hungary. Their father, Dr. Karoly, through whom the inheritance comes, came to America in 1848 and died in Aurora last January. About the same time Count Allois Karoly, Ambassador of Austria-Hungary to the Court of St. James, passed away in London, leaving an immense estate. The American Karolys immediately began to make investigations in hopes of learning that they would be his heirs. They were disappointed in this, but incidentally discovered a fortune almost as great awaited claimants who could prove heirship to their father.

PERSONAL.

Arthur W. Field has resigned the vice-presidency of the Peckham Motor Truck and Wheel Company, of New York city.

Wall Street and the Electrical Stock Market.

The general market has been very quiet, with an upward tendency, which was in the nature of a reaction from the lowest prices of the previous week. Business conditions have not improved, although it is believed that the tariff issue is a step nearer settlement than it was at the last writing. The number of striking employés has not increased, neither have they decreased. The settlement of the coal strike is in prospect in the near future, and it is thought that when this is accomplished it will change the aspect of affairs for the better.

The electrical stock market was without special feature and was very quiet. I continued to hear authentic reports of an increase in electrical business stimulated by the exceedingly low prices. Well posted authorities tell me that many enterprises which were started before the panic broke are now coming into the market for apparatus. Old companies, who have been large buyers of supplies all through the depression, are making a good many inquiries for new equipment. Easy money is doing much to stimulate this movement, as it renders the sale of new securities much easier.

Western Union was without special feature between 83⅝ and 84¼. The Collateral Trust 5 per cent bonds advanced to 108⅝.

General Electric was one of the active stocks of the week, in part regaining the ground lost during the previous week. The quotations ranged around 35. The debenture bonds were strong around 88½. An officer of the company characterized the rumors that the June 1st interest on the debentures would not be paid as absurd. He said the interest would be paid as usual. The preferred stock showed some strength over previous quotations, ranging around 65.

Of the less active stocks on the New York Exchange, we note: Edison Electric Illuminating of New York one sale at 98¼ on Monday, after which the stock was offered at par. A small lot of 5 per cent bonds sold at 106⅝; North American sold from 4 to 4½; American District and Cable at 87¼.

American Bell Telephone showed marked strength, advancing from 191 to 198. The movement was based on talk that the company would eventually succeed in its efforts to increase its capital from $20,000,000 to $50,000,000. A prominent stockholder of the company was quoted as saying that if the State of Massachusetts did not allow the increase the company can borrow what it needed through a bonded mortgage. If it did not pursue this latter policy, it can sell out to the Long Distance company, which was incorporated under the laws of New York, which would allow it to increase its capital as desired. It is said that the company will declare an extra dividend of $3 in July besides its regular dividend.

Westinghouse preferred was firm at 51½ to 52½; the common stock weakened somewhat, selling at 36½ to 37. I hear considerable talk to the effect that the common stock will pay a dividend for the first time in its history in July. The meeting to decide upon this measure will be held in the middle of June. If the dividend is not paid in July, it is said it will be paid in the October quarter. The statement was published during the week to the effect that the company had orders on hand for $800,000 of goods.

Of the less active stocks on the Boston Exchange, Erie telephone was firm around 45; New England telephone between 59 and 60; Fort Wayne electric was bid 2¾ and held at 3.

I hear continued reports of increasing business with General Electric. It is said that it has orders as far ahead as August 1, aggregating $400,000. It recently increased its force 400 men at Schenectady. The chemical and standard testing departments were recently moved from Lynn to Schenectady. The executive committee of the company which handles the administrative business was recently appointed as follows: H. McK. Twombly, New York; C. H. Coster, New York; T. Jefferson Coolidge, Jr., Boston; H. I. Higginson, Boston; Gordon Abbott, Boston; Robt. Treat Payne, Jr., Boston; and President C. A. Coffin, member *ex-officio*. BAIN.

New York, June 2.

John Ridall Sues the Brush Company.

John E. Ridall, of Pittsburgh, has entered suit against the Brush Electric Company, of Cleveland, Ohio, to recover $135,000. He has also issued a foreign attachment to attach money in his own hands belonging to the defendant company. Ridall states that in December, 1889, he entered into an agreement with the defendant company which made him sole agent for the company in certain territory. The company, however, in violation of the agreement, sold to the Short Electric Company, and Short & Company, electrical machines and apparatus to the amount of $75,000. The plaintiff asserts that he is entitled to a commission on this amount, of 20 per cent, making $15,000. The defendant also sold the Brush double arc lamp and permitted them to be sold by other agents to the number of, at least, 10,000, the sales amounting to $300,000. On this the plaintiff's commission would amount to $60,000. In addition the plaintiff by being deprived of the sale of the lamps, lost the sale of the apparatus and machinery that he could have obtained at the same time. On this he claims a loss of $60,000, making a total claim of $135,000.

In referring to this suit Mr. S. M. Hamill, secretary and general manager of the Brush Electric Company, says that there are large amounts due the Brush Company from other companies as royalties on arc lamps infringing the Brush double carbon arc lamp, the patents on which have been broadly sustained by the courts. "Mr. Ridall has no claim under his contract against the Brush Company," said Mr. Hamill. "If he has any claim at all it would be against customers in his territory who have purchased infringing lamps, and even then he probably could not collect more than from $10,000 to $15,000, because his territory simply covers Pittsburgh and a small surrounding country. Under any circumstances Mr. Ridall could hardly get anything from us until we secure damages from others."

ELECTRIC RAILWAY NOTES.

The New Jersey Traction Company wants a franchise at Morristown, N. J.

There is a demand for an electric road from Atlanta, Ga., to West Atlanta, running on a fifteen minute schedule.

The street railway company, at Terre Haute, Ind., began to use oil for fuel last week, owing to the scarcity of coal.

The Troy, N. Y., City Railway Company is experimenting with a life guard furnished by the Jones Car Works, of West Troy.

The assurance of the construction of the Watch Hill, R. I., Electric Railway has caused the Westerly and Watch Hill Steam Ferry Company to reduce its fares.

The contract for constructing between 30 and 40 miles of electric railway has been awarded by the Bridgeport, Conn., Traction Company to Thomas Murray, of New York.

Work on the project to double track the Braddock and Turtle Creek Street Railway from Braddock to Bessemer, Pa., and to extend the line further up the valley has been commenced.

The Atlanta, Ga., Traction Company, operating 25 miles of street railroad, has been placed in the hands of a receiver on application of local companies. W. C. Hale was appointed receiver.

The motion of the United States to enjoin the Gettysburg Electric Railway Company from building a trolley road on the Gettysburg battle field was denied in the United States Court, in Philadelphia, Pa., on May 29, and the motion was dismissed.

The Milwaukee, Wis., Electric Launch company has closed a contract with the Milwaukee Street Railway Company by which the latter will charge the storage batteries for the launches. The company proposes to make connections with the street railway cables at North avenue bridge.

Wenona Beach, the Summer resort on which thousands of dollars were expended by the Electric Railway Company, at West Bay City, Mich., has been sold to a new corporation. The place was not opened last season, but the new owners will spend a large amount of money in improving it and will open it to the public this month.

The Cosmo Company, of Chicago, representing J. J. Burs, J. H. McInheny and K. G. Ripley, has secured the franchise of the old Goshen Electric Street Railway Company, and has been incorporated as the Indiana Electric Railway Company. It is proposed to connect Goshen and Elkhart, Ind., by an electric railway, and run a spur from Goshen to New Paris, where it will connect with the Wabash Railway.

The Card Electric Company's Single Motor Equipments for Street Railways.

The Card Electric Company, of Mansfield, Ohio, has recently developed a system of single motor electric railway equipments, portions of which are shown in the accompanying illustrations. This company is a believer in single motors for electric cars, and their system has been developed on the strength of this opinion.

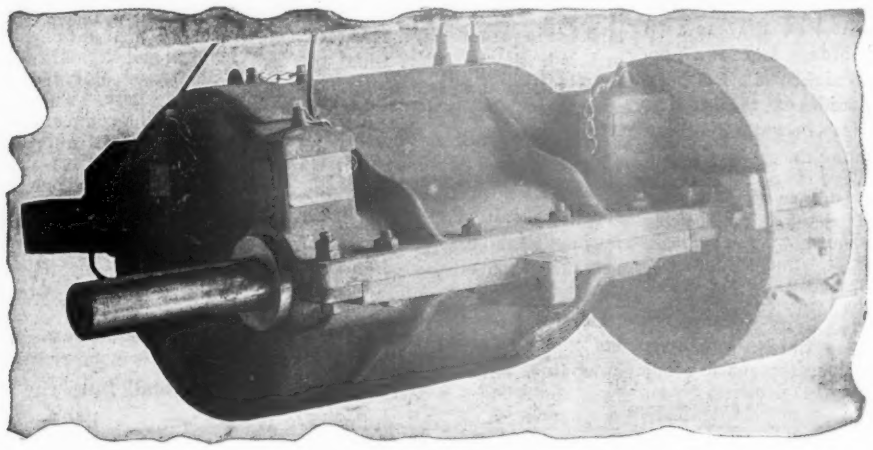


FIG. 1.—FRONT VIEW OF CARD RAILWAY MOTOR.

It is reported that work is now fairly begun on the Chicago and St. Louis Electric Railway, which, it is claimed, will transfer passengers from one city to the other at the rate of 100 miles an hour. Fifty teams and gangs of workmen are busy on the grade at Alpine Heights, 20 miles out. It is expected that the line will be in operation to Alpine Heights by November. It is the intention to have 25 miles of the Chicago division, from Chicago to New Lenox, five and one-half miles east of Joliet, running by Fall. The power house will be at New Lenox.

NOTES OF INTEREST.

John R. Lionberger, president of the Missouri Street Railway Company, of St. Louis, died on May 20.

It is proposed to organize a subway company at Kansas City, Mo., which shall furnish underground conduits for all kinds of electric service.

The fire alarm telegraph and police signal system wires at New Haven, Conn., will probably be placed underground, an appropriation of $5,429 having been recommended for the purpose.

Fig. 1 shows a front view of the Card motor with the case closed. All working parts are encased within the cast frame of the motor and are protected from dirt and moisture. The frame possesses great rigidity. In Fig. 2 is shown the steel bar for strengthening the cast extensions that form the spring supports. The bar rests in grooves, cast for the purpose, and is clamped down by two eye-bolts fastened by pins between the hinge ribs at the bottom, and clips over the top, dividing the strain equally between four points, overcoming all danger of breaking after long service, through a gradual crystallization of the cast metal.

The controlling stand with the cover removed is shown in Fig. 3. The operating handle is placed centrally on top of the cover and turns a short shaft, from which motion is transmitted to another shaft, shown at the left, by means or two small sprocket wheels and a chain. Immediately under the cover is the reversing switch, the handle extending through the case at the right. On the longer shaft are placed eight cams, insulated from it by heavy, hard rubber tubing and secured by hard rubber pins. Opposite each cam is a switch fastened by a suitable bracket or base to the back near the shaft. Each switch is provided with contact pieces to engage with clips on binding blocks fastened to the back. At the bottom of the stand is a series of binding blocks for making connection between controller motor, resistance and the line.

The commutator turning attachment is shown in Figs. 4 and 5. No matter how well or of what material a commutator is made, it will sometimes need turning off. To do this in the old way necessitates the taking of the armature from the motor and sending it to a lathe, perhaps in some machine shop where the danger of injury from handling is great. With the Card device the commutator can be turned off without removing the armature, and be made absolutely true with the journals. The case can be opened and the commutator turned off in no longer time than would be required to take the armature out and put it on the floor. When the motor case and armature is lowered, the pinion is released from the gear wheel and is used as a means for turning the armature. This is done with a leather belt making connection with the pulley and crank handle fastened to the case. One attachment will answer for any number of motors.

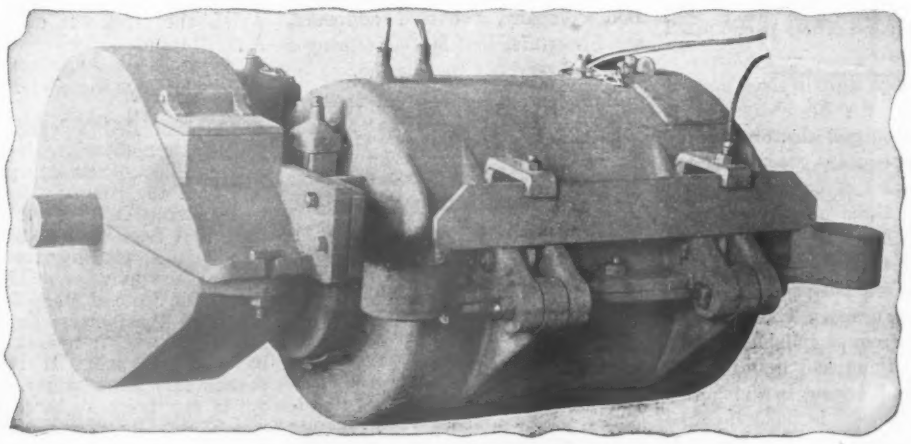


FIG. 2.—REAR VIEW OF CARD RAILWAY MOTOR.

The Johnson-Lundell Railway System to be Tried in New York.

It is said that negotiations are now under way, which, if successful, will result in equipping Twenty-third street, New York city, from river to river, with the Johnson-Lundell underground electric railway system. This system was illustrated and described in the ELECTRICAL REVIEW for May 9, 1894.

Brooklyn Electrical Society.

The fourth regular meeting of the Brooklyn Electrical Society will be held on Thursday evening, June 7, at the residence of R. J. Times, Jr., 26 Prospect Place, Brooklyn. Thomas A. Bamford will give an illustrated talk on the construction of telephones.

Sadie M. Means, telephone operator at Columbia, S. C., may now work on Sunday, and still be a good Presbyterian. So the General Assembly of the Southern Presbyterian Church has decided.

LIGHTING OF THE MID-WINTER FAIR.

THE ENTERPRISING ELECTRIC LIGHTING COMPANIES GREATLY ASSISTED THE SUCCESS OF THE FAIR—DETAILS OF THE LIGHTING.

Electricity is proving an important factor in adding to the popularity and attractiveness of the California Mid-Winter International Exposition. The illumination of the grounds and buildings is not, of course, upon so extensive a scale as at the World's Fair, but as far as the general effects are concerned the California Exposition is not far in the background. The marked contrast in the style of architecture between the two expositions works an advantage for California. This is especially noticeable where the Old Spanish Mission style predominates, as in the Horticultural and Agricultural building. The outlining in rows of incandescent lamps of

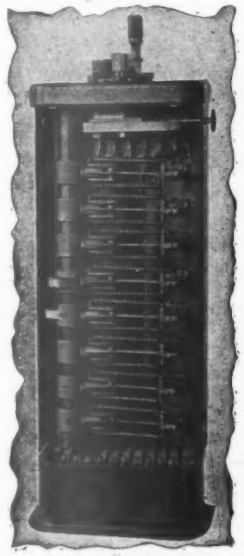


FIG. 3.—CARD CONTROLLER STAND.

the natural and graceful curvings so characteristic of this style of architecture lends a pleasing effect to the eye not obtainable where the outlining is carried out with almost mathematical exactness. The harmonious blending of bright colors used in the decoration of so many of the buildings, so in contrast with the one color predominating at Chicago, also adds greatly to the lighting effects.

The five main buildings are located around a Court of Honor in the shape of a parallelogram. This court, encircled by rows of arc lights, is a typical California garden, resplendent with the flora of the State, and abounding in a variety of palms and other verdure of a tropical nature. From its center rises the Bonet electric tower, which was illustrated in the ELECTRICAL REVIEW several months back. It is to the Mid-Winter Fair what the Ferris wheel was to Chicago and the Eiffel tower to the Paris Exposition. This steel structure, rising to a height of 272 feet, is the most imposing feature of the illumination. It is studded with nearly 4,000 vari-colored incandescent globes, which, through the agency of an automatic revolving switch, are thrown in and out of the circuit, presenting to the vision a beautiful combination of kaleidoscopic changes, depicting the many colors of the rainbow. Shields, banners and many other designs are outlined in various colors, and are constantly appearing and disappearing. An elevator runs to the height of 220 feet. The search light stationed at the extreme height of the tower has an intensity which, although merely guessed at, is placed at 350,000 candle-power, and under favorable atmospheric circumstances can be seen at a distance of 120 miles. The lighting of the tower was in charge of the Western Electric Company.

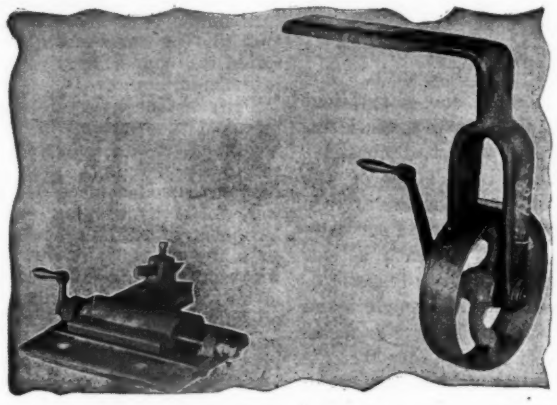


FIG. 4.—PARTS OF CARD COMMUTATOR TURNING ATTACHMENT.

To the extreme north of the court one of the electric fountains which attracted world-wide attention at the Chicago Fair is nightly admired by thousands. When from Machinery Hall is sounded the whistle giving notice that in five minutes the fountain will play, a great hegira of people approaches from all directions; the lights on the main buildings and grounds are extinguished; the huge tower is darkened and stands forth like a grim spectre with only the search light upon its top remaining active, and throwing its rays alternately upon the fountain, darkened buildings and grounds. There is a smaller search light stationed in one of the towers of the Mechanics' Arts Building. Through the agency of different colored glasses this smaller light, when thrown upon the playing fountain, adds greatly to the color effects already produced.

The Firth wheel, half the size of the famous Ferris wheel, is illuminated greatly after the style of the latter, the power being furnished by a separate plant. Many of the concessions of California's "Midway Plaisance" are profusely decorated with both arc and incandescent lights.

The lighting of the Chicago Exposition is considered more in the light of a great engineering feat. In this respect the California Exposition differs. It is notable more especially when we consider the remarkably short space of time in which the plant was placed in working order in face of financial as well as many other difficulties. It was impossible for the management to purchase the necessary machinery and they were dependent entirely upon the generosity of the different companies in placing their machinery for advertising purposes. Many questioned the financial responsibility of the Exposition, and it was nearly two months before the opening that the use of the machinery was proffered. The opening took place in January and by the middle of October not an engine had been secured. When it dawned upon the people that nothing but success was crowning the efforts of the management machinery was freely offered. The Standard Electric Company came forward with four arc machines and necessary lamps for the Agricultural and Mechanics' Arts Buildings; the Fort Wayne company with two 60 light arc machines and a 2,500 light alternator furnishing light for the Administration Building, Festival Hall and the Exposition offices; the Western Electric Company took the lighting of the Manufacturers' and Liberal Arts Building in hand, and thus, through the generosity of these and other companies the present successful lighting of the Exposition was accomplished.

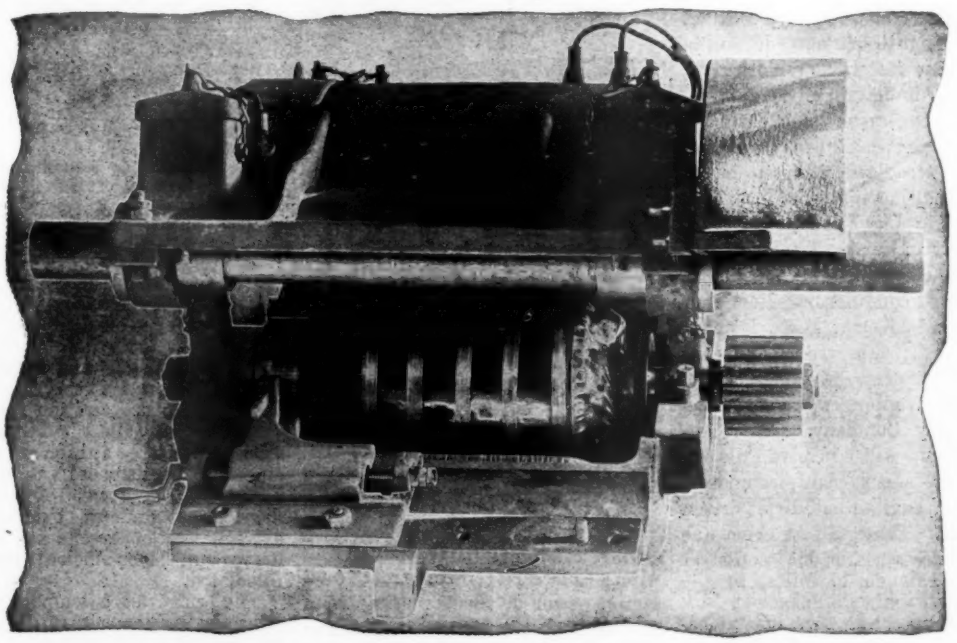


FIG. 5.—CARD RAILWAY MOTOR SHOWING METHOD OF USING COMMUTATOR TURNING ATTACHMENT.

The 27th of January was the time set for the formal opening of the Exposition. On the 10th of the month not a boiler was in place, the engines not installed and no line wire strung. The opening day, January 27, arrived. Over 102,000 feet of wire had been strung, poles erected and 600 arc lights were in circuit.

Too much credit cannot be given to W. F. C. Hasson, chief of the electrical department, for his untiring efforts which made the lighting the success it proved. To the skilled employés is also due great credit, as none received but laborer's wages.

J. R. K.

San Francisco, Cal., May 30, 1894.

Telephone Message Rate.

THE METROPOLITAN TELEPHONE AND TELEGRAPH COMPANY'S NEW EXCHANGE SERVICE SCHEDULE.

The following is the schedule of the Metropolitan company to take effect June 1, 1894, for New York city south of 110th street:

Number of Messages.	Two-party Line.	Direct Line.	Excess Messages.
700	$100	....	$15 per 100
800	110	....	12 "
900	120	....	12 "
1,000	130	$150	12 "
1,100	138	158	10 "
1,200	146	166	10 "
1,300	154	174	10 "
1,400	161	181	9 "
1,500	168	186	9 "
1,600	175	195	9 "
1,700	182	202	9 "
1,800	188	208	8 "
1,900	194	214	8 "
2,000	200	220	8 "

For more than 2,000 messages direct lines only will be used and the rate of advance will be $5 per 100 with $7 per 100 for excess messages.

For these rates lines will be metallic circuit and equipped with long-distance transmitters (wall or desk sets only). For a cabinet set (wall or desk) $10 per annum additional will be charged. An installation charge of $15 will be made for each station. Where an established station is brought under a message-rate contract the installation charge will not be made.

General Electric Company's Iron-clad Motor Hoist.

The General Electric Company has perfected its electric hoists, making them stronger, simpler and more compact. They are operated by motors of the railway type, in which all moving parts are thoroughly protected. The motor and the hoist are mounted on the same bed plate, to which all bearings, levers, quadrants and other connections are attached, making the machine complete in itself. The drum is provided with a powerful hand brake, lined with wood and operated by a lever, and is thrown in or out of gear by a friction clutch of positive and reliable type, operated also by a lever. The motor is controlled by a rheostat of standard type, which is thrown in or out by a lever. The pinion on the armature shaft and the intermediate gear with which it engages have machine cut teeth, and are enclosed in an oil casing. The electric parts of the hoist are thoroughly insulated. These hoists, one of which is shown in the illustration on this page, are made in 4, 10, 15, 30, 50 and 90 horse-power as usually rated.

Electrical and Mechanical Engineering and Trading Company.

A little more than a year ago Mr. J. H. Vail organized the Electrical and Mechanical Engineering and Trading Company. The company have in hand a variety of business, among which may be mentioned the following: Contract for car house, cars, motors, trucks and generators for Hoosick Railway Company, Hoosick Falls, N. Y.; contract for an electric light station and complete equipment at Rumsen Neck, N. J., for the Rumsen Improvement Company; contract for electric lighting in new addition to Buckingham Hotel, New York city; contract for underground conduit system, telephone system and electrical conductors for J. C. Hoagland and Raymond Hoagland, Rumsen Neck, N. J.; consulting engineers for Trinidad Electric Light and Power Company, Port of Spain, Trinidad; contract for electric lighting system, underground conduits, pole line, etc., for Edward Kemp, Esq., Rumsen Neck, N. J.; supervising and consulting engineers for Poughkeepsie City and Wappinger's Falls Electric Railway Company. This railway system will involve a 600 horse-power steam plant, compound condensing engines and direct driven generators. There will be some fine long distance work, as one section of the road extends 10 miles, to the towns of Wappinger's Falls and New Hamburg, operating cars in and between both towns. The plant will incorporate the use of Stirling boilers, compound condensing Ball & Wood engines, direct driven General Electric generators and General Electric 800 motors.

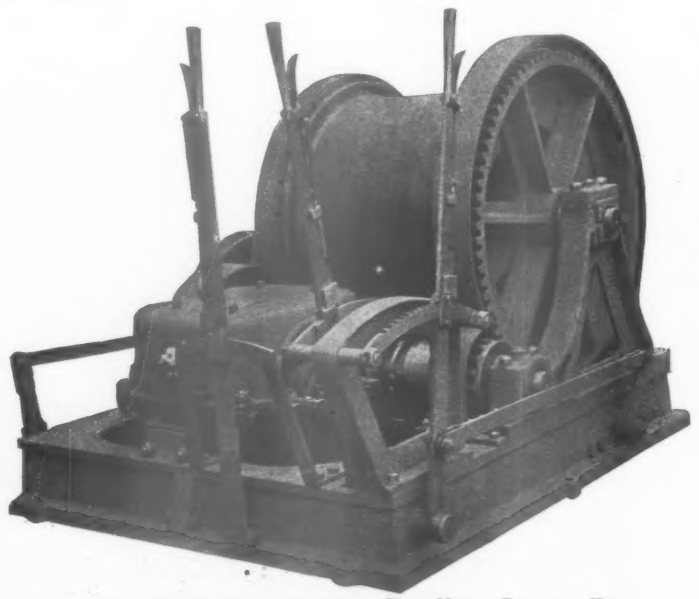
Mr. Vail gives all the business of his company his personal attention, and turns out none but the best of engineering and construction. The company have pleasant and commodious offices at 39 Cortlandt street, and here may be found some of the most expert and experienced engineers engaged in the business.

ALTERNATING CURRENTS AND FUSES.

READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, PHILADELPHIA, MAY 16, 1894, BY PROF. DUGALD C. JACKSON AND R. J. OCHSNER.

This paper is a report of an investigation made by Mr. Ochsner in the electrical engineering laboratory of the University of Wisconsin. The results are positive and of sufficient practical value to justify consideration. They set at rest all questions regarding the direct effect of the alternating current upon the average commercial fuse wire. Practically speaking, there is no such action. Mr. Ochsner's report is as follows:

The following work was undertaken with a view to studying the disintegrating effect of alternating currents on fuse metals which has been reported, and, if possible, ascertaining the cause. As the work done at Cornell University last year showed such a remarkable rise of resistance, and a lowering of the fusing points



General Electric Company's Iron-Clad Motor Electric Hoist.

of the fuses placed on the alternating circuits, I decided to repeat the experiments, and, if any change in the resistances should take place, to prolong them.

THE EFFECT OF ALTERNATING CURRENTS ON THE RESISTANCE OF FUSES.

Samples of fuse wire of five amperes rated capacity were obtained from five different manufacturers, and to these were added a 30 ampere fuse wire which we happened to have, and a copper, a german silver and an iron wire. Pieces of wire from each sample, each of them varying from nine to 10 feet in length, were wound upon cylindrical pieces of pine wood about a foot long and one and one-half inches in diameter. The table below gives the names of the firms from which the samples were obtained and their rated capacities.

	Rated Capacity.
Ansonia Electric Company (Wirt fuse wire)	30
Shawmut Fuse Wire Company (two samples)	5
The Independent Electric Company	5
Peru Electric Manufacturing Company	5
The E. S. Greeley & Company	5
Taylor, Dee & Mack	5
Iron wire	
German silver wire	
Copper wire	

To prevent the turns of wire from crowding together on the cylinders, thus causing short-circuits, short, helical grooves were made with a file. To the end of each fuse short pieces of heavy copper wire were soldered, and the joints were wiped with a damp cloth. These terminals were fastened to the wood by light staples and the ends were amalgamated.

A simple rack was constructed so that all the fuses could be put in series, the copper terminals dipping into mercury cups.

The resistances were determined by means of the Anthony bridge in the laboratory of the University of Wisconsin, the readings being taken to the fourth decimal place. Connections were made by dipping the copper terminals of the fuses into mercury cups and using short, heavy copper wires for leads. A dead-beat galvanometer was used and in this way it was possible to do the work in about 20 minutes. As it was impossible to keep the laboratory at a constant temperature it was necessary to make temperature corrections and, therefore, to determine the temperature co-efficients of all the samples. It was, however, possible to keep the temperature within a few degrees of 20 degrees centigrade, which I considered the standard temperature, and to which I reduced all my results.

Therefore, it was thought sufficiently accurate to determine the co-efficients in the following way, a small error in the co-efficient introducing only a slight error for a correction of a few degrees. On one occasion the room was allowed to cool to the outdoor temperature and the resistances were measured, and the next day the room was heated as high as possible and the resistances were again measured. A range of about 16 degrees centigrade was obtained. The average rise of resistances for one degree and the co-efficients were then calculated.

The bridge has a temperature coil, from the resistance of which the temperature of the bridge coils is quickly found. The temperature coefficient of the bridge coils is only .00023, and, therefore, the corrections for them can be made very accurately. The rise of the resistance for one degree centigrade and the coefficients, together with the data from which they were obtained are given in the following table, in which t is the higher temperature, t_1 the temperature of the bridge coils, and R the measured resistance corresponding. Similarly the letters marked with a prime correspond to the lower temperature.

No.	t	t_1	R	t	t_1	R	Rise for 1° C.	Coeff.
1	23.2	22.8	.4794	7.26	10	.4505	.00190	.00400
2	"	"	.0688	"	10	.0613	.00304	.00357
3	"	"	1.3025	"	10	1.2854	.00444	.00344
4	"	"	.8273	"	9.9	.7816	.00901	.00366
5	"	"	.9801	"	9.9	.8829	.00857	.00366
6	"	"	.8883	"	9.9	.8349	.00313	.00364
7	"	"	.9701	"	9.9	.9107	.00370	.00406
8	"	"	.2184	"	9.8	.2001	.00119	.00535
9	"	"	.8899	"	9.8	.8802	.00039	.00034
10	"	"	.4792	"	9.8	.4508	.00190	.00401

The fuses were now put on the alternating lighting circuit which furnishes the light for the laboratory. Enough resistance was put in series to give a current of about three amperes. The pressure is 110 volts, and the frequency, approximately, 125. The lighting circuit is run continuously, except for about nine hours on Sundays, but to have a check on the time that the fuses were subject to the current a Thomson recording wattmeter was placed in circuit.

The resistances of the fuses were measured at fairly regular intervals, and the corrected results were plotted.

The following table is a sample of one measurement. The resistance of the temperature coil was considered to vary uniformly during the test.

No.	Temperature.	Resistance Temperature Coil.	Resistance Leads.	Resistance.
1	20.30	267.2	.00322	.4785
2	20.30	.....	.....	.0683
3	20.35	.....	.....	1.2950
4	20.38	.....	.....	.8321
5	20.40	.....	.....	.9754
6	20.44	.....	.....	.8643
7	20.56	.....	.....	.9947
8	20.60	.....	.....	.2190
9	20.60	267.4	.00330	.8947

Average = 00321.

While making the ninth measurement I noticed that touching the fuses with the hands caused a decided increase in the resistance, and upon investigation it was found that a rise of over one per cent resulted from the heating of the fuses when holding them firmly with one hand. After that discovery they were handled with greater care, and a drop which is noticeable in the curves was the result. The heating effect of the bridge battery, although very small, was also found sufficient to introduce a slight error, but by depressing the keys only for an instant the error was rendered negligible. A little later I discovered that the indications of the thermometer, which was hung near the fuses, did not, by any means, represent the true temperature of the fuses. They had been heated by the alternating current to about 50 degrees centigrade and had not been given sufficient time to cool down to the temperature of the room, the pine wood retaining the heat for a considerable period. It was, therefore, decided not to pass any current through the fuse for some time, but to measure the resistance, as before, from day to day, being very careful in getting the temperatures accurate-

ly; but in the latter I was not entirely successful. It was found practically impossible to get the temperature of the fuses correct within a few tenths of a degree because the temperature of the room would vary in spite of all care, and the fuses would not follow this variation so rapidly as the thermometer indicated it. Nevertheless,

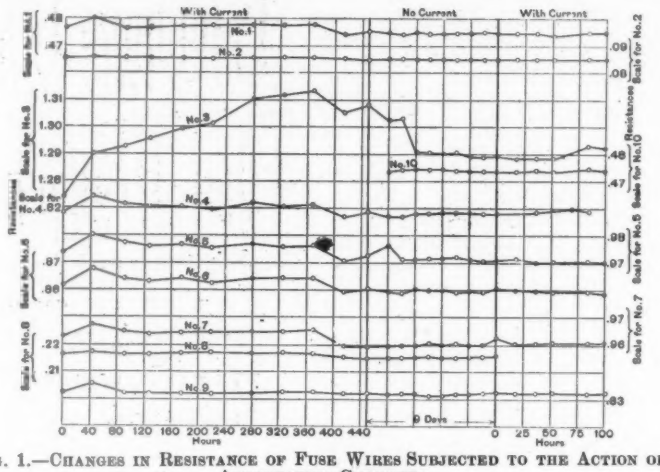


FIG. 1.—CHANGES IN RESISTANCE OF FUSE WIRES SUBJECTED TO THE ACTION OF ALTERNATING CURRENTS

far better results were obtained than before.

The result of this part of the work is shown by the curves, Figs. 1 and 2, between the two heavy vertical lines.

After this the fuses were again subjected to the alternating current for about 100 hours, measurements of resistance being made daily. Each day as the current was turned off they were cooled down rapidly by taking them into a cold room, and leaving them for some time, after which they were brought back to the working room and allowed to stand for about five or six hours before measuring the resistance. The results are shown by the last part of the curves. As fuse No. 3 seemed to show greater irregularity than the others, another piece of the same sample was added. It is the one numbered 10, and the curve is plotted directly under No. 3 for comparison.

From the 14th point on the curves are all practically straight horizontal lines, the irregularities being about the same when no current passed as when it did. Nearly all the points on the curves before the 14th were considerably higher. This shows plainly that the fuses had not cooled down to the temperature of the room when the resistance measurements were made, the variations depending on the length of time they were allowed to stand. Considering the average values of the last parts of the curves to represent the true resistance, the greatest variation was 1.8 per cent in the case of No. 3, and even this is not too large to be explained by the above errors. In proof of this, I measured the resistance of one fuse immediately after turning off the current, and also 15, 20, 35 and 50 minutes later, and found the errors to be respectively 8 per cent, 6.2 per cent, 3 per cent, 2.3 per cent and 1 per cent.

That the first point on each curve is nearly as low as the final values is due to the fact that current had not been passing through the fuses before that measurement was made, and the fuses were, therefore, at the temperature of the surrounding air which was recovered by the thermometer. Another proof that the variations are due to temperature is shown by curve No. 9. This represents a wire which has a very small temperature coefficient, and, accordingly, it varies the least of any. While the actual rise in curve No. 3 is much greater than in any of the others, the percentage rise is only slightly greater, the resistance of the fuse being the largest of all.

These experiments prove that there is no appreciable rise of resistance in fuses subjected to alternating currents, at least not within a period of 550 hours. More accurate results might undoubtedly have been obtained had the fuses been mounted in such a manner as to avoid contact with any large masses of solid material, but the accuracy is amply sufficient to prove the case.

These results are diametrically opposed to those given in the report of similar work, published in the transactions, vol. x, p. 262, already referred to. While, in the latter investigations, corrections were made for the standard resistance with which the fuses were compared, no such corrections were made for the fuse wires. The fuses were subjected to larger currents than in my tests, with consequent greater heating. The resistances were apparently measured without allowing sufficient time for the fuses to acquire the temperature of the room, and even if this was done, the variation in temperature of the room as given in the original report of the investigation (which Mr. C. P. Matthews, Instructor at Cornell University, kindly sent me) was sufficient to introduce serious errors. The resistances were measured by the fall of potential method. According to the drawing, showing the arrangement of the apparatus, no extra resistance is put in series with the battery to reduce the current strength. This current may have been sufficiently great, in the smaller sized fuses at least, to cause considerable heating. For these and other reasons relating to the accuracy of the tables, I think that this part of the work reported by Mr. Matthews is not to be relied upon, and, therefore, the conclusions based upon it are of no value.

THE EFFECT OF ALTERNATING CURRENTS ON THE FUSING POINTS.

Next, the fusing points before and after passage of current were determined. As the continuous current from the dynamo, which was available, was too variable I was obliged to use a few storage cells for fusing the wires.

A small, sensitive resistance, which could be varied slowly, was needed. A long german silver wire, stretched tightly, with a good spring clamp for a sliding contact, was found to serve admirably.

Six inch lengths of the fuses were soldered to short, heavy copper wire terminals, the ends of which were amalgamated and dipped into mercury cups in making connections. The fuse, variable resistance, storage battery and a Weston ammeter, reading from 0 to 15 amperes, were placed in series. As the current approached the fusing point it was varied very slowly and gradually, giving it ample time to heat the fuse. Only the five ampere wires were tested. A number of pieces of each of these were tested; half of these had been subjected to the alternating current and half had not. I shall call these the "old" and the "new" samples respectively. Pieces of the old and the new of each sample were tested alternately so as to eliminate the errors caused by a change in the temperature of the room. The results are given in the following tables:

FUSING CURRENTS.

Nos. 3 & 10 New.	No. 3 Old.	No. 10 Old.
7.40	7.25	7.30
7.50	7.10	7.29
6.98	7.10	7.10
7.19	7.09	7.20
7.30	6.80	7.05
Average, 7.23	7.07	7.188
	Lowered 2.22%.	Lowered .58%.

No. 4.		No. 5.	
New.	Old.	New.	Old.
8.75	8.50	8.90	8.82
8.83	8.60	8.90	8.84
8.80	8.60	8.20	9.12
8.70	8.70	9.20	8.88
8.76	8.65	8.95	8.88
8.70	8.70	9.10	8.97
8.62	8.64	9.06	8.70
8.71	8.64	9.08	8.80
8.50	8.64	8.93	8.79
8.88	8.65	9.09	8.83
Average 8.725	8.632	8.941	8.863
Lowered 1.07 per cent.		Lowered .87 per cent.	

No. 6.		No. 7.	
New.	Old.	New.	Old.
8.85	8.80	8.80	9.07
8.60	8.69	8.96	9.06
8.87	8.88	8.90	9.02
8.78	8.98	8.89	9.05
8.75	8.98	8.90	9.10
8.60	8.80	9.06	8.85
8.75	8.74	9.10	8.95
8.50	8.70	8.78	9.10
8.96	8.95	8.66	8.80
8.77	8.90	8.90	9.12
8 743	8.842	8.895	9 012
Rise of 1.13 per cent.		Rise of 1.32 per cent.	

Four of these samples show a slight lowering while two show a slight rise in the fusing point, but the differences are of the same order as the differences between individual test pieces. While a test of only a comparatively small number of fuses in this way hardly establishes the correctness of the results, a slight change in the fusing points probably did take place as is shown by the fair uniformity of the figures in each sample.

That such slight change as did occur was due to oxidation there is also little doubt, for all of the old fuses showed slight oxidation, and the effect is too small to be of practical moment. As to the results in the earlier investigation already referred to (Transactions, vol. x, page 65) on the fusing points, only the averages are given, and no mention is made of temperature; therefore it is impossible to properly judge of their accuracy. As far as can be determined from the original report, however, the tests do not seem to be any more reliable than the resistance tests.

Sir David Salomons, in the discussion of a paper by Mr. A. C. Cockburn, read before the Society of Telegraph Engineers and Electricians in 1886, stated that fuses alter in two ways with time. Most of the metals, especially alloys, according to Alexander Siemens, being subject to slight oxidation, which lowers the fusing point.

Dr. Salomons' own experience, he says, was rather the other way, the fusing point being raised with long use.

Mr. Cockburn had the same experience. Mr. Matthews also states that the formation of oxides in the case of tin, and the tin and lead alloys, may delay the fusion almost indefinitely, while the oxidation of copper and iron wire seems to favor its prompt fusion.

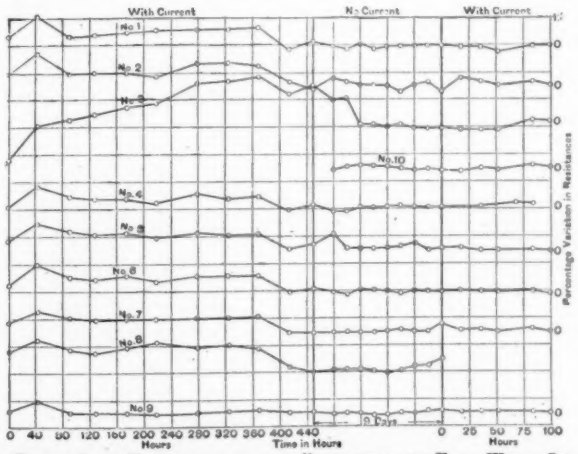


FIG. 2.—PERCENTAGE VARIATIONS IN THE RESISTANCE OF FUSE WIRES SUBJECTED TO THE ACTION OF ALTERNATING CURRENT. VERTICAL SCALE, ONE DIVISION EQUALS ONE PER CENT.

CONCLUSIONS.

In the light of the experiments herein described, and the statements made by Cockburn, Salomons and Matthews, is it necessary to ascribe a slight change in the properties of the fuse to the disintegrating effect of the alternating current? I think not.

In practice, a fuse is seldom obliged to carry a current equal to its full rated capacity. In electric lighting, for instance, the lamps protected by a fuse are not likely to be all turned on at once, and, therefore, the fuse is seldom carrying more than a small part of its rated capacity. The experiments that I have made, therefore, represent the conditions of ordinary practice and prove that a fuse as used in practice is not directly affected by the alternating currents.

Fuses on alternating current circuits are sometimes found to blow without apparent reason, but something outside of the disintegrating effect of the current is the cause. Under some conditions the result has come about through the mechanical shaking to which an alternating current fuse is sometimes subjected when not tightly clamped by the terminal screws.

The electric lighting at Buffalo Bill's Great Wild West Show in South Brooklyn is worth a visit. There you get the show, which Major John M. Burke so successfully manages, thrown in.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON MAY 22, 1894.

520,263. Carbon switch; Friedrich Von Hefner-Alteneck, Berlin, Germany, assignor to Siemens & Halske, same place.

520,264. Commutator; Carl Hoffman, Berlin, Germany, assignor to Siemens & Halske, same place.

520,274. Electric railway; Ernest Von Siemens, Berlin, Germany, assignor to Siemens & Halske, same place.

520,279. Electric switch; Henry E. Merline, Lancaster, Pa., assignor of three-fourths to Frank S. Barr, same place and Edwin L. Reinhold and Henry Burd Cassel, Marietta, Pa.

520,280. Automatic device for removing resistances in starting electric motors and replacing same; G. H. Whittingham, Baltimore, Md., assignor to the Automatic Switch Co., of Baltimore City, of Md.

520,299. Apparatus for heating metal electrically. 520,300. Method of heating, welding or working metal electrically; Chas. L. Coffin, Detroit, Mich.

520,304. Conduit electric railway; William R. De Voe, Shreveport, La.

520,306. Telephone transmitter; Henry M. Goodman and John Goodman, Louisville, Ky.

520,323. Block system for trolley railways; Willard F. Lewis, Swampscott.

520,329. Overhead trolley conductor; Robert Muir, Brooklyn, N. Y.

520,340. Electric traction apparatus; Paul Schoop, Zurich, Switzerland.

520,351. Electrical contact mechanism; John F. Blake, New Haven, Conn.

520,356. Conduit electric railway; Guarantee Trust and Safe Deposit Co., administrator of Charles Wm. Siemens, deceased, Philadelphia, Pa.

520,359. Apparatus for electric welding. 520,360. Apparatus for electric welding. 520,361. Electrical measuring instrument; Rudolph M. Hunter, Philadelphia, Pa., assignor to the Johnston Co., of Pennsylvania.

520,378. Multiple electric fuse box; Edward A. Parson, Ottawa, Canada, assignor of one-half to Haldane Millar, same place.

23,287, 23,288, 23,289, 23,290, 23,291, 23,292, 23,293, 23,294, 23,295, 23,296, 23,297, 23,298, 23,299, 23,300, 23,301. Case for electrical measuring instruments.

PATENTS EXPIRING MAY 22, 1894.

191,076. Circuit closers for electro-magnetic railway switch signals. H. N. Rowell, Concord, N. H.

191,130. Metrical telegraph system. Theo. M. Foote, Brooklyn, N. Y.

191,176. Chemical telegraph; Charles A. Randall, Brooklyn, N. Y.

191,177. Electric lights. N. E. Reynier, Paris, assignor to C. B. M. Du Breil, Quimerch en Bannaleo, France.

ADVANCE INFORMATION.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

Electric Light and Power.

ELLSWORTH, ME.—Address Mayor with estimates of cost of establishing electric light plant.

WEST CHESTER, PA.—Address A. P. Hall regarding proposed electric light plant for State Normal School.

PITTSBURGH, PA. — Address Longfellow, Alden & Harlow, Vandegrift Building, concerning incandescent electric light plant for Mt. Aloysius Convent, Cresson, Pa.

VICKSBURG, MISS. — Vicksburg Electric, Transit and Lighting Company is preparing to erect an electric power plant.

PITTSFIELD, ME.—The Pittsfield Water Company has been organized for the purpose of supplying water to said town for domestic and municipal purposes; also with light, heat and power by electricity, with $20,000 capital.

ALLEGHANY, PA.—The sub-committee on public lighting has contracted with R. C. Tannahill for the erection of an additional electric light plant on Braddock street for $25,893.

ST. LOUIS, MO.—Missouri Electric Repair Company has received contract from the Alton, Ill., Roller Mill Company for electric light equipment for their plant.

COOPERS, W. VA.—The Bluestone Electric Light Company; capital, $50,000. Incorporated by J. Cooper.

HUDSON, N. Y.—The Citizens' Electric Light and Power Company; capital, $10,000. Incorporated by S. D. Lake.

FISHKILL LANDING, N. Y.—The Heat, Light and Power Company; capital, $40,000. Incorporated by W. D. Haven.

ELIZABETH, N. J.—The Royal Arc Company; capital, $3,000,000. Incorporated by A. Bellamy.

HELENA, ARK.—The Helena Gas Company will erect an electric plant.

WINSTON, N. C. — An electric motor is wanted by the Lanier Printing Company.

SANTA CRUZ, CAL.—Santa Cruz Electric Light and Power Company, loss by fire.

TIPTON, IOWA.—The Tipton Electric Light Company; capital, $12,000. Incorporated by W. N. Freichler and others.

CUTHBERT, GA.—An electric light plant is under consideration.

HILLSBORO, TEX.—The Hillsboro Electric Light Company will establish an electric light plant. Contract has been made with the city government for street lighting. Address E. G. Shields for further information.

New Electric Railways.

PHILADELPHIA, PA. — Northern Electric Street Railway Company, incorporated; capital, $150,000.

CLEVELAND, OHIO.—A company is organizing with $300,000 capital to establish an inter-urban electric street railway between Cleveland and Akron.

LANCASTER, KY.—Address Fred. Balcom concerning new electrical railroad proposed between Lancaster and Nicholasville, a distance of 22 miles.

MEMPHIS, TENN.—The Citizens' Street Railroad Company has made preliminary surveys for an electrical railroad to Binghampton.

HAMMOND, IND.—A project is on foot here to run a new electric street car line through West Hammond and Burnham, and to make connections with the Calumet Electric Railway, which will leave the passenger in the heart of Chicago in less than an hour's time.

BRAZIL, IND.—An electric street car line is proposed between this place and Terre Haute.

LEAVENWORTH, KAN.—The Leavenworth Electric Railway Company has been granted a franchise to build the Soldiers' Home and Mount Muncie extension.

WATERPORT, N. Y.—Articles of incorporation of the Waterport Electric Light and Power Company, under which Captain Lina Beecher proposes to build the northern section of his single rail electric road, have been filed. The capital is $40,000. Work is now about to start near Waterport.

New Telephone and Telegraph Companies.

PALESTINE, TEX.—L. C. Ketcham has petitioned the City Council for franchise to construct a telephone system.

VERNON, ALA.—T. J. Young is constructing a telephone line from Vernon to a point 12 miles distant.

PALATKA, FLA.—The Palatka Telephone Company; capital, $10,000. Incorporated with Marcus Loab, president, and George Mundee, secretary.

KNOXVILLE, TENN.—The East Tennessee Telephone Company will construct a line to Chattanooga.

New Manufacturing Companies.

NEW ORLEANS, LA.—The New Orleans Construction Company, incorporated; capital, $50,000.

CHICAGO, ILL. — The Illinois Electrical Reminder Company; capital, $25,000. Incorporated by W. C. Jones, Geo. L. Cragg and Geo. S. Buell. Will deal in electrical goods, machinery, etc.

RED BANK, N. J.—The Rumson Improvement Company has been incorporated with a capital of $100,000 by Applegate & Hope.

NEW YORK CITY.—The Acme Belting Company; capital, $30,000. Trustees, George A. Pierce, George T. Moore, George F. and Charles T. Page and A. H. Chase.

CHICAGO, ILL.—Chicago Inland Electric Company has been incorporated with a capital of $100,000. Incorporators, Carl Pehrson, Geo. E. Schumaker and Percy Taylor.

INDIANAPOLIS, IND.—The Fort Wayne Electric Manufacturing Company has filed articles of incorporation. The capital has been fixed at $10,000. Directors, Frederick Eckert, William Orr, James H. Orr, Henry Eckert and Frederick Eckert, Jr. The object of the company is to manufacture and sell incandescent lamps, appliances and materials for electric lighting.

PORTLAND, ORE.—The Automatic Electric Coupler and Train Signal Company has been incorporated with a capital of $100,000, for the purpose of purchasing, owning and selling patent rights on electric car couplers, etc. Incorporators, W. E. Wamsey, Geo. W. Simons and others.

NEW YORK, N. Y.—Geo. L. Colgate Company, incorporated; capital, $20,000. For manufacturing electrical machinery. Incorporators, Geo. L. Colgate, Fanwood, N. J.; Geo. O. Van Tonst, Jr., 543 Herkimer street; I. A. Stevenson, 394 Shepard avenue, Brooklyn, N. Y. Address letters care of P. L. Klock, 203 Broadway, New York, N. Y.

CHICAGO, ILL.—Cutler-Hammer Manufacturing Company, incorporated; capital, $4,000. To manufacture and deal in electrical appliances and supplies. Incorporators, H. H. Cutler, E. W. Hammer and R. L. Commons.

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"I have treated rather fully the questions of interference with the telephone currents from outside sources, especially the troubles from electric railways; for my practice in that direction, during the last four or five years, has been considerable, and enables me to deal with that subject in the light of personal experience. This question is still of considerable importance in this country, and its treatment here may be of assistance to managers of exchanges in practical work.

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